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ABSTRACT

One or more graduate departments from ten schools participated in studies of six different disciplines: chemistry, English, history, philosophy, physics, and psychology. Subjects were students who first enrolled for graduate study in these departments between 1957 and 1960. Predictor data obtained for the students included scores on the Graduate Record Examinations Aptitude Test and/or an Advanced Test and, for some students, their undergraduate grade-point averages. Two criteria were used to assess performance in graduate study: departmental ratings of the quality of graduate work, and a classification of each student's academic attainment (e. g., "earned Ph.D.", etc.) as of October, 1963. The results varied widely from group to group, and the generalizations noted are tentative. Noting the critical importance of graduate study and effective prediction of success, the report ends with recommendations for improving prediction: (1) clarify "the nature of success in graduate school"; (2) explore issues involved in assessing the performance of each student; (3) identify additional predictors of success; and (4) form an overall grading of "promise" on the basis of all information available about a student at the time of admission. (Author/ROF)

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THE GRADUATE RECORD EXAMINATIONS

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GRE

Cooperative Studies of Predicting Graduate School Success

Gerald V. Lannholm
Gary L. Marco
William B. Schrader

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GRE

COOPERATIVE STUDIES OF PREDICTING GRADUATE SCHOOL SUCCESS

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I.

INTRODUCTION

Background and Purpose

These studies had a twofold purpose. One was to evaluate the effectiveness of scores on the Graduate Record Examinations (GRE) and other factors in predicting success in graduate study in certain departments in selected graduate schools. The other was to provide suggestions to other departments and schools that might wish to study the effectiveness of their own selection procedures.

In recent years there has been a marked increase in both the number of persons seeking admission to graduate study and in the number applying for the growing number of fellowships offered by government agencies, private foundations, and the universities themselves. This increase in applicants has emphasized the need for dependable methods of identifying the potentially most capable students. Traditionally, the undergraduate record has been the most widely used index for this purpose. Such information is most useful when the graduate school admissions officer is familiar with the program and standards of the college from which the applicant received his baccalaureate degree. It becomes increasingly difficult for him to assess the comparative quality of applicants as the number of different colleges from which they present credentials becomes larger and larger.

As a result, more and more graduate schools and fellowship donors have asked applicants to submit Graduate Record Examinations scores to supplement other required information (2). This trend has brought with it the need for more assistance in making effective use of the test results.

Earlier studies supported the hypothesis that tests of pertinent knowledge and academic aptitude are useful in selecting graduate students (4). Those studies also demonstrated that a combination of test scores and the undergraduate record was a better predictor of success in graduate study than either used alone.

More recently, certain graduate schools have conducted their own validity studies (3). However, the results of many of these studies had limited value for one or more of the following reasons:

> Since the only predictors involved in most of the studies were the test scores, the relative weight that should be given to other predictors was not indicated.
>
> Frequently the only evidence available to indicate the student's degree of success in graduate study consisted of grade-point averages. Because course grades seldom have high reliability, may reflect different qualities, and are usually restricted in range, they have serious limitations for use as criteria in validity studies.
>
> Most of the studies were oriented toward prediction of success during the first year of graduate school only. Studies that take into account the performance of doctoral candidates after three or more years of graduate study are needed.

Recognizing the increasing use of GRE scores and the limitations of many validity studies, the Committee on Testing of the Association of Graduate Schools in the Association of American Universities recommended

in 1962 that Educational Testing Service (ETS) undertake studies in cooperation with several graduate schools. Serving at that time as the ETS Advisory Committee on Graduate Level Testing, the Committee urged that the plan of these new studies make provision for the following:

> Participation of departments in several disciplines in several different graduate schools known to have required GRE scores of applicants for some period of years.
>
> Selection of a period of time sufficiently long to permit full-time graduate students to complete requirements for the Ph.D. degree.
>
> Collection of predictor data in addition to GRE scores.
>
> Use of criteria of graduate school success other than, or in addition to, grades in courses.
>
> A plan of treatment of the data not limited to correlational analysis.
>
> Development of a presentation of the results that would have practical applications both for the participating departments and for others wishing to study selection procedures.

Usefulness of These Studies

Forecasting future events is difficult in any field. It is particularly so for human behavior. Although future academic performance is dependent upon the level of general mental ability of the student, it is also influenced by various other factors for which dependable assessment instruments or procedures are not available. These include such factors as motivation, methods of study, personality attributes, and the like.

It is important and useful, nevertheless, to study the relationship between certain characteristics possessed by graduate students at the time of admission and the success of these students in graduate study. Because of the influence of factors such as those mentioned above, the relationship between measures of intellectual competence (e.g., undergraduate college grades and scores on scholastic aptitude and achievement tests) and degree of succ may be only modest for a given group of students. However, if the degree of this relationship is positive and determined to be relatively stable, it can be assumed that the predictors are focused on significant dimensions of the applicants' preparation for graduate work. Efforts can than be concentrated on obtaining information concerning the other factors likely to influence their level of performance.

The results obtained in the studies reported herein generally demonstrate positive relationships between scores on the Graduate Record Examinations and assessments of graduate school success. These findings also indicate how predictive effectiveness is affected when test scores are combined with undergraduate averages to evaluate the applicant's potential.

Evaluating the usefulness of test scores for graduate admissions requires knowledge over and above that provided by statistical results, however. The informed judgment of scholars who know the subject matter of a particular discipline and who have studied each appropriate test in terms of what it is attempting to do deserves as much or more consideration in evaluating the tests. Only if the specific results reported

herein are interpreted with due regard to judgments based on the tests themselves can the empirical data make their proper contribution to wise admissions policies.

Limitations

Ideally, a validity study should produce a set of facts which, when evaluated on the basis of logical and practical considerations, point clearly to a definite course of action. Although the data presented here do not meet this ideal, they supply some information relevant to the problems of graduate school admissions. The lack of desired clarity in the results is mainly attributable to two causes:

1. Virtually every group consisted of a relatively small number of students. In most validity studies done at ETS, the minimum acceptable sample size is 85 students. In the present study, only two of the 22 groups met this standard for size. Reducing the minimum acceptable size seemed preferable to limiting the studies to relatively large graduate departments. Nevertheless, it must be recognized that statistical results based on relatively few observations are subject to large fluctuations and offer an insecure basis for generalizations.

2. Students in each of the groups had been selected, in part, on the basis of the predictors used in the studies. Statistical results based on a selected group tend to underestimate the degree of relationship that would be found for the more heterogeneous applicant group. The effectiveness of a predictor in discriminating within a group of admitted students may be noticeably less. Because of the widespread use of tests and previous academic record in selecting students, this

limitation of the present studies is characteristic of virtually all current validity studies.

These two features create difficulties in interpreting the results. On the whole, however, it seemed better to tolerate the complications than to limit the studies to large and unselective (and therefore atypical) departments.

II.

DESIGN OF THE STUDIES

Selecting Subjects for a Prediction Study

Any of several approaches may be employed in the selection of groups to be used in a study of the predictive effectiveness of various measures of academic potential. One is to start with a group of entering students and to obtain information on each student at the time of admission. After the lapse of a pre-determined number of years of study, data are collected on the performance of each student. This approach constitutes an actual follow-up study and requires the investigator to wait for some time to obtain the data needed for his analysis.

A second method is a variation on the "follow-up" approach. At a given point in time, data are collected on the performance of students who began graduate study at some designated date in the past. These data may include such information as grades received in courses, progress toward attainment of the advanced degree, and special ratings on the student's overall quality of performance. These data are then compared with available information about the students' qualifications at the time of admission. The problem with this approach is that the predictor data will be limited to the information collected and recorded by the institution when the students were admitted. (For example, if GRE scores were not required for admission, it would not be possible to

study the relationships between the test scores and subsequent performance in graduate study.)

A third approach is to collect both predictor data and evaluations of graduate school success for each student at the same time. Test scores would be obtained by administering the desired tests to the enrolled graduate students in the department(s) selected for the study. This plan is probably unsatisfactory for several reasons. The students might resist taking admissions tests after they had been engaged in graduate study for some time. The assumption that the students would have received the same scores had the tests been taken at the time of admission would be difficult to substantiate. Also, this method eliminates from the study all students who had been enrolled but discontinued graduate study for one reason or another.

Participants in the Studies

Several factors were considered in the selection of graduate schools and departments to be invited to participate in this research project. It was first decided that, to ensure representation of some variety of disciplines, two fields in each of three broad areas of study--the social sciences, the humanities, and the natural sciences--would be selected. Second, the GRE tests must have been required for several years for admission to graduate study in the departments selected. Third, a sufficient number of doctoral students had to be enrolled to make a study feasible. Finally, so that full-time graduate students would have been enrolled for several years prior to October 1963, only those students who were first enrolled between

the fall of 1957 and June 1960 would be included. A combination of these considerations resulted in the selection of six disciplines for participation in the studies: chemistry, English, history, philosophy, physics, and psychology.

In the fall of 1963, 32 departments in 15 different universities were invited to participate in the studies. (A copy of the letter of invitation is included in Appendix A of this report.) Subsequently, data were received from 21 departments in 10 schools. From two of these graduate departments enough data were also received for students who were admitted into the doctoral program prior to 1957 to make a study possible. The schools from which one or more departments participated were: University of Colorado, Cornell University, Duke University, University of Florida, University of Miami, University of North Carolina, University of Rochester, University of Southern California, University of Texas, and Yale University.

Students who had attended undergraduate school in countries in which English was not the primary language were excluded, as were a few blind students. It was also decided later to exclude students for whom certain predictor data and graduate study information were not provided. The number of students finally included varied from 116 in the largest of the groups studied to 25 in the smallest. (One group of only eight students for whom the required data were available was also eliminated.)

Choosing the Predictors

The term "predictor" commonly designates a measure or variable (e.g., test score) used to forecast the magnitude or classification of

of another variable known or thought to be related. It should not be necessary to state that the predictor variables selected for use in graduate school prediction studies should have logical relevance to the tasks to be undertaken by the graduate student. No complete and definitive answer has ever been given to the question: "What characteristics (abilities, attitudes, etc.) are essential for success in graduate study?" Nevertheless, there is probably pretty general agreement on certain of the qualities that are logical indicators of academic competence. One of these is the individual's record of previous achievement, e.g., his undergraduate grades. Because grading practices vary from one institution or professor to another, such data are often supplemented by the scores on aptitude and achievement tests required of all of a department's applicants.

Although undergraduate records and test scores cannot be expected to cover all dimensions essential to success in graduate study, they do provide evidence concerning important qualities. The fact that such information is widely used in the selection process makes it readily available for use in studies such as those reported here. It also underscores the importance of having many more departments conduct similar studies to assess the effectiveness of their own selection procedures.

Description of the Predictors

The individual predictors selected for use in these studies were the undergraduate grade-point average (Ug-GPA), the GRE Aptitude Test Verbal Ability score (GRE-V), the GRE Aptitude Test Quantitative

Ability score (GRE-Q), and scores on the GRE Advanced Tests (GRE-Adv.) relevant to the departments participating in the project. The following paragraphs indicate the nature of these predictor variables and the combinations of certain of them that were developed and tried out.

Undergraduate GPA The participating departments were asked to furnish the undergraduate average grade for each student included in the studies. These grades were requested on a uniform basis for all students in the group. Where the undergraduate averages had been adjusted for differences in standards among the colleges represented, the adjusted averages were requested. The averages received were placed on a scale of 0 (F) to 4.00 (A). When letter grades were furnished, they were transformed to this scale by setting A equal to 4.00, A- to 3.67, B+ to 3.33, B to 3.00, and so on.

The GRE scores The Verbal Ability section of the GRE Aptitude Test provides a measure of verbal reasoning and reading comprehension. The Quantitative Ability section includes various kinds of quantitative-mathematical questions involving arithmetic reasoning, algebraic problems, and the interpretation of graphs, diagrams, and descriptive data. Each of the Advanced Tests is designed to measure mastery of the subject matter in the program of the undergraduate major in the field of the test.

The scores are reported on a scale with a mean of 500 and a standard deviation of 100 for a basic reference group of college seniors. At the time these studies were conducted, the maximum

score range for the Verbal Ability and Quantitative Ability scores was 200-900; for the Advanced Tests the range was 200-950.

Judgmentally weighted totals One method of combining data from several predictors to obtain an overall prediction is to assign weights to each predictor on the basis of judgment or "common sense". In order to evaluate this judgmental approach, a set of rules for assigning relative weights to each available predictor was formulated as follows:

> The relative weight given to Verbal Ability and Quantitative Ability Aptitude Test scores should depend on the nature of the field of study. It was judged that verbal scores should be weighted twice as heavily as quantitative scores for predicting performance in English, history, and philosophy, and that quantitative scores should be weighted twice as heavily as verbal scores for students in chemistry and physics. The two scores were assigned equal weight for psychology students.
>
> The Advanced Test score, if available, should be given a weight equal to the sum of the weights for the two Aptitude Test scores.
>
> The undergraduate average grade, if available, should be given a weight equal to the sum of the weights assigned to the available GRE scores.

Application of these principles resulted in the following plan of weights for the participating departments. It will be noted that the judgmental weight for Undergraduate GPA is never less than 4. This rule was used to avoid excessive rounding error when the adjusted weight for this predictor was expressed as an integer.

In the actual use of this method by a department, two separate steps must be taken. First, on the basis of a consensus, the relative importance of the various available predictors would be expressed in

Plan of Judgmental Weights Assigned to Predictors

Department	Undergraduate GPA	GRE-V	GRE-Q	GRE-Adv.
CHEMISTRY				
A	6	2	4	-
B	-	1	2	3
ENGLISH				
C	-	2	1	3
D	6	2	1	3
E	6	4	2	-
E*	-	2	1	-
F	6	4	2	-
HISTORY				
G	6	2	1	3
H	6	4	2	-
I	-	2	1	3
PHILOSOPHY				
J	-	2	1	3
PHYSICS				
K	-	1	2	3
L	4	-	-	4
M	6	2	4	-
PSYCHOLOGY				
N	4	2	2	-
N*	-	2	2	-
O	-	1	1	2
P	4	2	2	-
Q	-	1	1	2
R	4	2	2	-
S	4	1	1	2
T	-	1	1	2

*Students enrolled in the doctoral program prior to 1957.

numerical form. Thus, if each predictor were judged to be equally important, each would be given a weight of 1. On the other hand, if it were judged that thorough subject-matter preparation and college work were

especially significant, the Advanced Test might be weighted 3, undergraduate record 3, with weights of 1 or 2 for the two Aptitude scores.

Many different combinations of weights might commend themselves to various persons responsible for graduate admissions. The essential feature of the first step is to express these judgments in definite, numerical terms. The second step is to allow for the fact that different measures of promise are expressed in markedly different numerical form. For example, undergraduate record may be expressed on a scale ranging from 0 to 4, while the GRE scores may range from 200 to 950. Statistically, the best indicator of the size of unit for this purpose is its standard deviation. For practical purposes, it was thought unnecessary in these studies to distinguish between the units of the various GRE scores. On the other hand, it was indispensable to put the undergraduate record into units that would be of the same general size as those used for the scores. The standard deviation of GRE Verbal scores was used as an index for this purpose if Verbal had equal or greater judgmentally-assigned weight than GRE Quantitative scores. Otherwise, the standard deviation of Quantitative scores was used. This standard deviation was divided by the standard deviation of undergraduate record in order to obtain a multiplier which would put the latter predictor on roughly the same footing as the test scores. For example, it will be noted that the rules used in obtaining the judged weights in this study gave a weight of 6 to undergraduate GPA. The table given on page 29 shows that the standard deviation of the Quantitative score is 95 for this department while that for the Undergraduate GPA is .37. If we

multiply 6 by 95 and divide by .37 the result turns out to be approximately 1500. Actually, since GPA was expressed in the data to two decimal places, the simplest procedure was to drop the decimal point and multiply the values by 15. Although more decimal places could have been carried, it was considered important to facilitate the arithmetic operations. Although there might be merit in taking precise account of the standard deviation of each predictor, the relatively simple procedure used in these studies should be adequate for practical purposes.

Statistically weighted totals For the four groups of 60 or more students statistically weighted totals of the predictors were correlated with the criterion of success. The method used for determining the weights was multiple linear regression. No other method of weighting would yield a higher correlation coefficient for the given data. Because the results are quite unstable when based on a small number of cases, this method was not used in these studies for groups of less than 60 students.

The Criterion Data

The selection and definition of acceptable criteria of success in graduate study is a pivotal step in a prediction study. What constitutes success in graduate study? What data should be used to represent the degree of such success? Any study concerned with the prediction of performance in graduate school must deal with these questions.

One index frequently used to indicate success is the grade-point average. This is determined for each student from the grades received in the courses pursued in his graduate study program. The typical grade-point average, however, has several limitations for use as a criterion measure. The grades seldom show much range or discrimination, and represent, at best, faculty judgments of the performance of the students in only one part (i.e., courses taken) of the graduate program. Moverover, from a statistical viewpoint, graduate school grades are often unreliable. Finally, the grade-point average usually does not provide a measure of the student's degree of excellence in meeting other requirements (e.g., competence in research) for awarding the doctorate.

To overcome the limitations of course grades as a basis for judging success in graduate study, some investigators have attempted to develop other criteria. Some have used the ratings (often limited to "pass" or "fail") assigned on the general qualifying examination, or on a final comprehensive examination set by the local faculty. These examinations are often of the essay type. While they may cover many of the important objectives of the graduate study program, they also fail to assess the quality of the student's research ability, commonly considered to be a primary objective of the doctoral program.

Since the preparation of a research document, known as the dissertation, is a common requirement for doctoral candidates, an evaluation of the dissertation would seem to provide the needed assessment of the student's research competence. However, it appears to be difficult, if not impossible, to develop acceptable objective standards

for appraising the degree of excellence of the completed dissertation. Possibily even more difficult is the task of determining the extent to which the dissertation presented for approval represents the actual competence of the student himself. Was he alone responsible for perceiving and defining the problem, for designing the procedure to be employed in collecting the data, for the interpretation of the findings, and for the actual writing of the report? To what extent did his adviser control each of these phases and how much did he participate in the preparation of the dissertation before permitting it to be submitted to the committee or faculty for evaluation? To what extent is the student's own originality and competence reflected in the final product?

Reasoning that the satisfactory completion of required courses, the passing of examinations, the presentation of an acceptable dissertation, etc., are simply required parts of the program toward the final objective, some thoughtful educators contend that the ultimate criterion of success in graduate study is the attainment or non-attainment of the doctorate. While the logic of this reasoning is apparent, this approach, too, presents problems. For example, should any specific time limit be designated? Should success be defined as attainment of the doctorate within a specified number of years? If the period designated is too short, may not some students be classified as failures for causes other than lack of academic competence? On the other hand, to extend the period indefinitely may result in lack of comparability of requirements and standards for those being judged several years earlier and those currently presenting

themselves for final judgment. Finally, it is clear that at least some students who fail to complete the program at a particular school may have changed their goals or have transferred to another graduate school.

The criteria of success described below were selected in an effort to avoid or ameliorate some of the limitations described above.

The criteria for these studies Each of the participating departments was first asked to assign each student who enrolled for the first time in 1957, 1958, 1959, or 1960 to one of six categories according to his status in the doctoral program as of October, 1963. In the case of inexact fits, the department was instructed to assign the student to the best fit status. The categories were as follows:

- Earned Ph.D.
- Has passed all examinations but has not received degree.
- Has not passed all examinations but is currently enrolled.
- Withdrew at request of university.
- Withdrew voluntarily after more than one year of study.
- Withdrew voluntarily after one year or less of study.

For each student classified in the first three status categories listed above, the department was also requested to furnish an overall evaluation of the general excellence. This evaluation was to represent the combined judgment of a departmental committee asked to assign quality ratings so that the percentage for each level would be within a suggested

range for each. The quality levels were as follows:

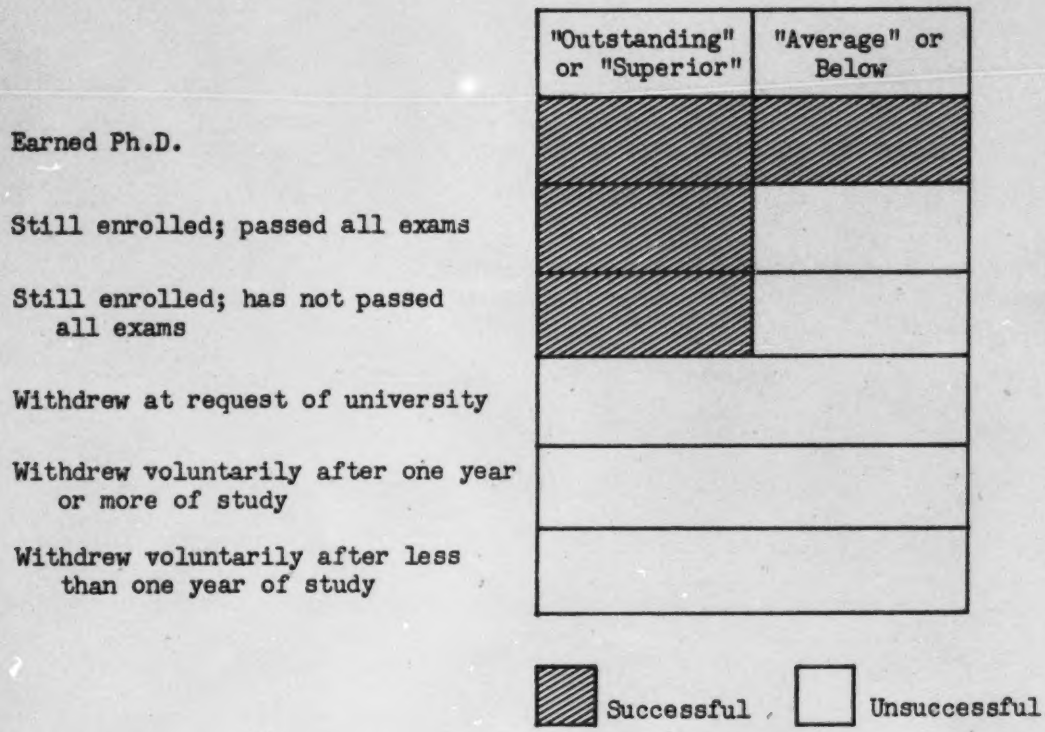
- Poor (5% to 15% of the group)
- Below Average (15% to 25% of the group)
- Average (35% to 45% of the group)
- Superior (15% to 25% of the group)
- Outstanding (5% to 15% of the group)

These ratings had reference in each case to the local group being studied. No attempt was made to develop a scale that had the same meaning across departments.

A review of the status classifications and of the quality level ratings revealed that even for the larger participating departments the number of students per status category or quality level was too small to warrant studies of relationships between predictors and these criteria separately by subgroup classes. Accordingly, it was decided to use the two types of information obtained for each student to develop a dichotomized criterion: "successful" and "unsuccessful".

Students who had received their degrees were deemed successful regardless of their quality level ratings. Those who had withdrawn, voluntarily or otherwise, were considered not to have succeeded. The students who were still enrolled were then classified as "successful" and "unsuccessful" according to the quality level of their overall ratings. Those whose quality level ratings were "superior" or "outstanding" were assigned to the successful group. The remaining students (with ratings of "poor", "below average", or "average") were placed in the unsuccessful group. The following diagram illustrates

how the various status categories and quality level ratings were combined to form the successful-unsuccessful dichotomy for the criterion measure.


"Outstanding" or "Superior"
"Average" or Below
Earned Ph.D.
Still enrolled; passed all exams
Still enrolled; has not passed all exams
Withdrew at request of university
Withdrew voluntarily after one year or more of study
Withdrew voluntarily after less than one year of study
Successful
Unsuccessful

Statistical Procedures

The traditional way of expressing the degree of relationship between a predictor and a criterion measure is the correlation coefficient. Admittedly, the interpretation of correlation coefficients presents serious difficulties because selection on the predictors tends to reduce the size of the coefficient and because they are subject to substantial sampling fluctuations when based on groups as small as many of those in these studies. In addition, the coefficient

cannot readily be translated into directly meaningful statements about probabilities of success. In order to deal with this limitation, graphs are used in the following pages to compare the academic performance of students in the upper half of the group on each predictor with students in the lower half of the group on that predictor. More detailed results on outcomes are shown for upper-half and lower-half students in a series of tables that accompany the graphs.

A special problem in the determination of correlation coefficients arises when, as in this study, the criterion variable takes only two values, success and failure. For purposes of analysis, it was decided to assume that if the success-failure variable could be measured in greater detail, it would follow a normal distribution, with a few students brilliantly successful, a few dismal failures, and the great majority falling at various points in between. If this assumption is justified, the appropriate coefficient to use is the biserial correlation coefficient. On the whole, it was judged that results expressed as biserial correlation coefficients would be most appropriate for comparison with those obtained in validity studies using more conventional criterion measures (e.g., grades).

III.

THE RESULTS

Interpretation of Results

These studies were designed to obtain empirical evidence about the effectiveness of Graduate Record Examinations scores and undergraduate grade-point average in predicting performance in certain graduate departments and to aid other departments in designing and interpreting their own empirical studies.

The need for empirical data on validity is widely recognized. It is true that the use of each of the predictors studied can readily be justified on logical grounds: a student whose undergraduate performance is mediocre is hardly a promising prospect for graduate work; ability to deal effectively with verbal and quantitative concepts is clearly relevant to the demands of graduate study; and a strong undergraduate preparation in his field is a strong asset to the beginning graduate student. At the same time, each of the predictors taken alone is subject to certain difficulties. It is argued, for example, that colleges differ widely, both in the ability level of their students and in their grading standards. Performance on an aptitude test, by definition, does not provide information on how well prepared the student is. And the interpretation of achievement test performance as an index of promise is hampered by wide differences in amount and quality of preparation at the time of testing. Data on the relation

of the various available predictors to actual performance in graduate school should be helpful in deciding upon the relative weight to give to each in predicting performance of future candidates for admission.

Empirical validity data, however, have their own limitations. In particular, statistical results when used as a basis for generalization beyond the group studied are subject to sampling fluctuations. Such fluctuations are large when the groups studied are small. Moreover, when a validity study is based on students who have been selected, in part, on the basis of one or more of the predictors, the validity coefficients will tend to be low. For example, if a graduate school was so fortunate as to admit only students with virtually a straight-A record, it could hardly expect undergraduate GPA to predict relative performance within the selected group. Both of these complications, which are characteristic of validity studies generally, are especially acute in predicting graduate school success. Generally speaking, more confidence in generalizing is possible for a larger group than for a smaller one, and groups having a relatively small standard deviation for a particular predictor are also likely to show a relatively small validity coefficient for that predictor. These considerations should be kept in mind in interpreting the results of these studies.

Results by Major Fields

In the sections that follow, the data are grouped by departments within the same major field. The larger groups in a given field are considered first, since these results are somewhat less affected by

sampling fluctuations. For each department, three types of information are given:

a. correlational results relating scores on various predictors to success as defined in this study.

b. a graph showing the relative success of students in the upper half and students in the lower half of the group on each predictor

c. a table showing in greater detail the academic status of students in the upper half and the lower half of the group on each predictor.

It should be noted that to preserve anonymity, the code designation of a graduate school that had more than one department in the study is different for each department.

It may be observed that for each predictor variable two bar graphs are presented. The number in the solid bar is the percent of students in the upper half on that predictor who were classified as "successful" in graduate study (i.e., had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior). The number given in the white bar is the percent of students in the lower half on the same predictor who were judged "successful." The difference between these two percents gives an indication of the effectiveness of the upper half or lower half standing on the predictor as a forecaster of success in graduate study.

The tabular information given below each set of graphs shows for each predictor the number of students in each of eight defined status groups who were in the upper half on the predictor and the number who were in the lower half. Some students could not be assigned

directly to either the upper or lower half on a particular predictor because the group included an odd number of students or because of tie scores at the dividing point. The results for these students were assigned to the two halves by prorating. For presentation here the resulting decimals have been rounded to the nearest tenth.

Summary

Although the data for graduate students in Chemistry are too limited to justify more than a tentative conclusion, they do support the judgment that Quantitative Ability is important. The judgmentally weighted total performed reasonably well as a predictor, though the data do not support the relatively heavy weight that it gives to Undergraduate GPA and Advanced Chemistry Test scores.

Prediction of Academic Status for Graduate Students in Chemistry

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Chemistry[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department A (116 students)					
Validity Coefficient	.13	.21	.26	---	.26	.30
Mean	3.07	539	628	---	---	---
Standard Deviation	.37	100	95	---	---	---
Highest Score	4.00	780	850	---	---	---
Lowest Score	2.00	280	330	---	---	---
	Department B (20 students)					
Validity Coefficient	---	-.12	.47	.22	.31	---
Mean	---	614	691	694	---	---
Standard Deviation	---	84	115	88	---	---
Highest Score	---	740	850	830	---	---
Lowest Score	---	430	500	440	---	---

[a] For the total 1964-67 Candidate Norms group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Advanced Chemistry	620	109	

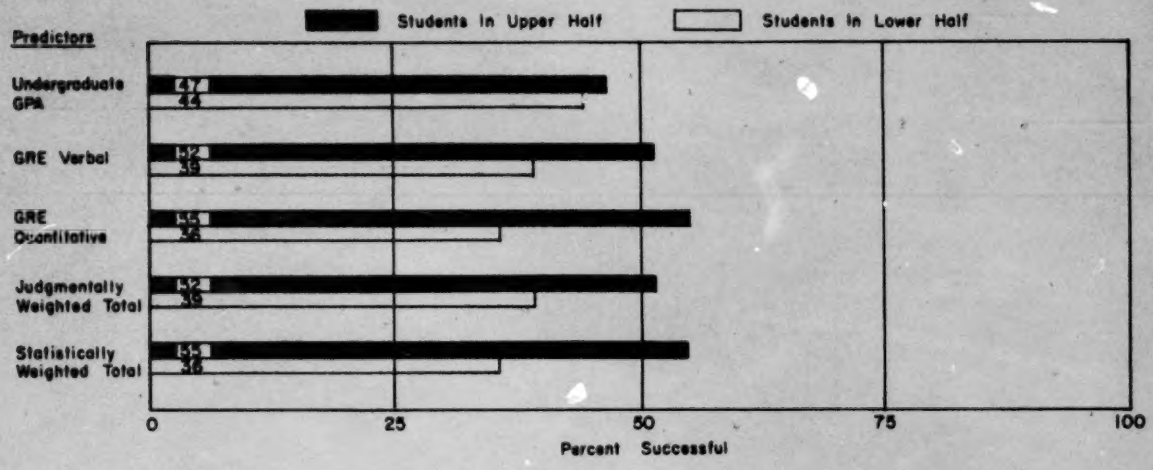
Department A
116 Students

Correlation coefficients and the bar graph opposite agree in showing a modest degree of relationship between the predictors and success in graduate school. However, the Undergraduate Grade-Point Average (GPA) is somewhat less effective than the other predictors. This may have resulted, in part, from the fact that the group was relatively homogeneous in this variable.

The statistically weighted total has a slightly higher coefficient than the judgmentally weighted total for this group. Examination of the detailed results on status indicates that the difference between the two weighted totals arises from a difference in predicting voluntary withdrawals.

Department A
116 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	23.3	4.1	0	6.2	0	2.5	5.4	16.4
	Lower Half	20.7	4.9	0	7.8	0	7.5	3.6	13.6
GRE Verbal	Upper Half	23.2	7	0	7	0	1.5	4.2	15
	Lower Half	20.8	2	0	7	0	8.5	4.8	15
GRE Quantitative	Upper Half	26	6	0	5	0	2	4	15
	Lower Half	18	3	0	9	0	8	5	15
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	25.7	4.7	0	6	0	2	6	13.7
	Lower Half	18.3	4.3	0	8	0	8	3	16.3
Statistically Weighted Total	Upper Half	26	6	0	6	0	2	5	13
	Lower Half	18	3	0	8	0	8	4	17

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department B
20 Students

In this school, the judgmentally weighted total and Advanced Chemistry Test scores showed a modest degree of relationship with success.

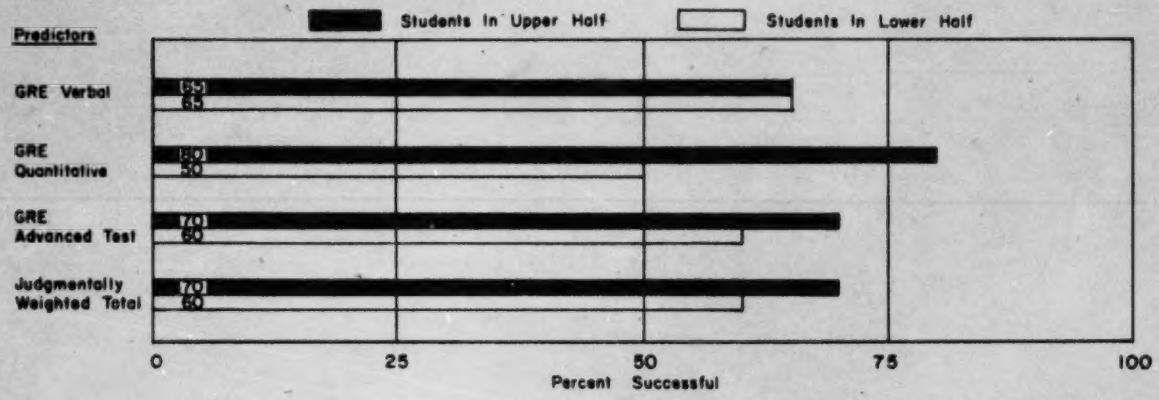
Quantitative Ability scores showed a noticeably higher correlation coefficient and Verbal Ability scores yielded a small negative coefficient.

Examination of the detailed results on status on the opposite page shows that of six students who withdrew voluntarily, five were in the lower half of the group on Quantitative Ability scores.

CHE[illegible]

Department B
20 Students

I. Percent [illegible] lower halves of group on each predictor who had ear[illegible] Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	6.5	0	0	1	0	0	2	.5
	Lower Half	6.5	0	0	0	0	0	0	3.5
GRE Quantitative	Upper Half	8	0	0	1	0	0	1	0
	Lower Half	5	0	0	0	0	0	1	4
GRE Advanced Test	Upper Half	7	0	0	0	0	0	2	1
	Lower Half	6	0	0	1	0	0	0	3
Judgmentally Weighted Total	Upper Half	7	0	0	1	0	0	2	0
	Lower Half	6	0	0	0	0	0	0	4
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Summary

For the two largest groups of graduate students in English, results were reasonably in accord with expectation. In one of the two groups, Quantitative Ability scores proved to be a somewhat better predictor of success than might be expected. Success was predicted with substantial effectiveness in one group and with modest effectiveness in the other, relatively highly selected group. In the one small pre-1957 group studied, Verbal Ability scores showed a relatively high validity. In the two remaining groups, neither Undergraduate GPA nor Aptitude Test scores showed any appreciable predictive power.

Prediction of Academic Status for Graduate Students of English

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Literature[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department C (98 students)					
Validity Coefficient	---	.25	.13	.31	.32	.34
Mean	---	724	576	705	---	---
Standard Deviation	---	59	108	58	---	---
Highest Score	---	830	800	810	---	---
Lowest Score	---	540	250	510	---	---
	Department D (81 students)					
Validity Coefficient	.49	.32	.45	.43	.61	.67
Mean	3.08	611	490	626	---	---
Standard Deviation	.51	102	96	87	---	---
Highest Score	4.00	800	770	790	---	---
Lowest Score	1.70	340	300	350	---	---
	Department E (54 students)					
Validity Coefficient	-.19	.12	-.13	---	-.12	---
Mean	3.07	631	522	---	---	---
Standard Deviation	.27	80	95	---	---	---
Highest Score	4.00	810	680	---	---	---
Lowest Score	2.30	460	290	---	---	---
	Department E (25 pre-1957 students)					
Validity Coefficient	---	.47	.08	---	.34	---
Mean	---	657	498	---	---	---
Standard Deviation	---	79	111	---	---	---
Highest Score	---	810	790	---	---	---
Lowest Score	---	500	310	---	---	---
	Department F (32 students)					
Validity Coefficient	.01	.17	.00	---	.10	---
Mean	3.38	651	540	---	---	---
Standard Deviation	.51	89	109	---	---	---
Highest Score	3.96	820	830	---	---	---
Lowest Score	2.07	470	380	---	---	---

[a] For the 1964-67 Candidate Norms Group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Literature in English	586	93	

Department C
98 Students

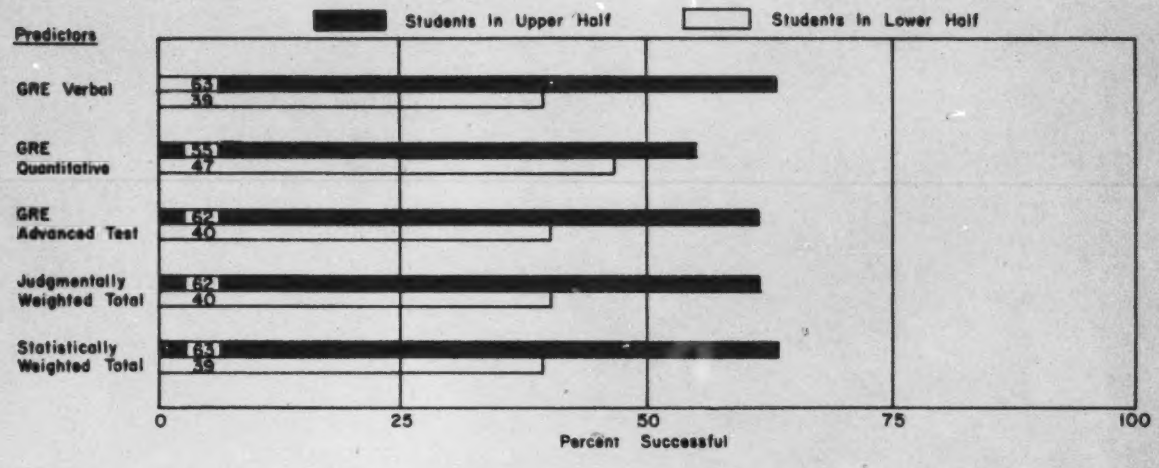
Considering both the correlation coefficients and the supplementary data on the opposite page, Verbal Ability and Literature in English Test scores, the judgmentally weighted total, and the statistically weighted total were about equally effective in predicting success in this department. On all four of these predictors, more than 60 percent of students in the upper half of the group succeeded while only about 40 percent of students in the lower half succeeded. Quantitative Ability scores showed only a slight relation to success. The correlation coefficients for the two weighted totals were .32 and .34.

It seems safe to conclude, however, that the correlation coefficients underestimate the value of these predictors for selection, since the group is markedly homogeneous in ability. The standard deviation of Verbal Ability scores is the smallest found in any of the 21 groups having data on this predictor and is less than half as large as the standard deviation for candidates in all fields. For this group, the average score was 724 and the lowest score was 540. The standard deviation of the Literature in English Test scores was almost the same as that for Verbal Ability scores.

The fact that the judgmentally weighted total and the statistically weighted total had almost identical validities indicates that the arbitrary weights used in the judgmentally weighted total were satisfactory for this particular group. Examination of the detailed results for the academic status of the group shows that of 25 students who earned the Ph.D., 17 were in the upper half of the group on the judgmentally weighted total and 18 were in the upper half on the statistically weighted total.

Department C
98 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	17	12	2	7	2	3	2	4
	Lower Half	8	8	3	14	1	3	0	12
GRE Quantitative	Upper Half	13	13	1	8	1	2	1	10
	Lower Half	12	7	4	13	2	4	1	6
GRE Advanced Test	Upper Half	14.6	13	3	10.3	1	4	0.1	3
	Lower Half	10.4	7	2	10.7	2	2	1.9	13
Judgmentally Weighted Total	Upper Half	17	11.3	2	9.7	1	3	1	4
	Lower Half	8	8.7	3	11.3	2	3	1	12
Statistically Weighted Total	Upper Half	18	11	2	10	1	3	1	3
	Lower Half	7	9	3	11	2	3	1	13

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department D
81 Students

The most striking fact in the results for this group is the relatively high validity coefficients for the composite predictors. The correlation coefficient (.61) for the judgmentally weighted total is the second highest found in any of the 22 groups studied.

The graphical results show a marked contrast in success between students in the upper half and those in the lower half on every predictor.

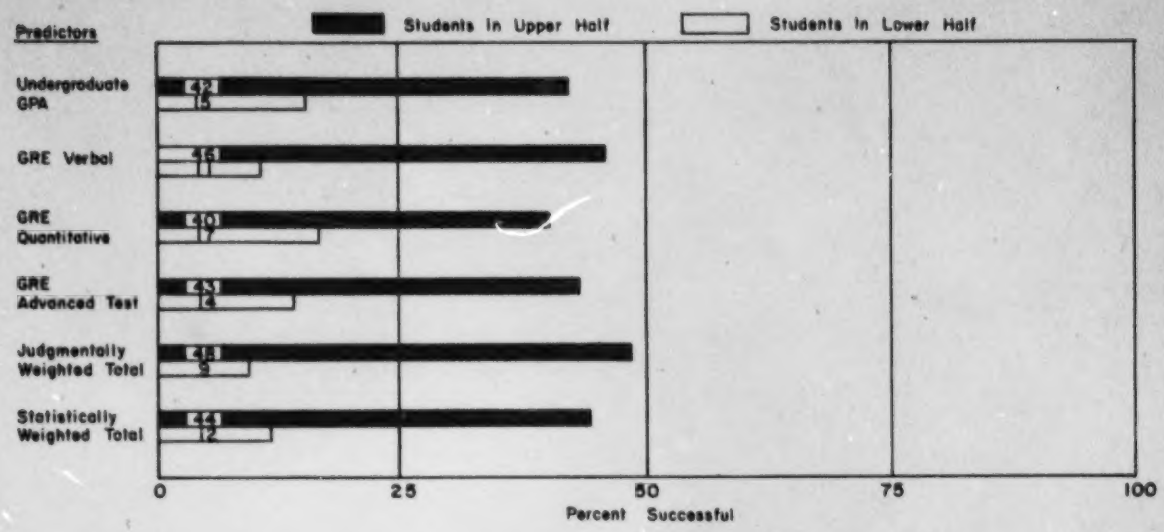
Somewhat unexpected is the relatively high validity coefficient for the Quantitative Ability score. It is higher than the coefficient for Verbal Ability or for Literature in English Test scores. The graphical results, however, show that when scores are used to divide students into upper and lower halves, Quantitative Ability is slightly less effective than the other predictors.

Finally, when the detailed status data are examined, an even more remarkable finding emerges: Quantitative Ability excels even the composite predictors in identifying students who earned Ph.D.'s. Of 11 students who earned the Ph.D., nine were in the upper half in Quantitative Ability. For the judgmentally weighted total, 8.5 of the 11 and for the statistically weighted total, seven of the 11 were in the upper half. Whether the good showing of Quantitative Ability as a predictor of success in English is characteristic of this graduate school or only of this particular group of students cannot be determined from the available data.

One final point may be worth noting. Eleven students of the 81 withdrew at the request of the school. Only one of these students was in the upper half on the Literature in English Test score and only two were in the upper half on the Verbal Ability score and the two composite predictors.

Department D
81 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	6.1	1	10	0	11.2	4.1	5.1	3
	Lower Half	4.9	0	1	1	15.8	6.9	4.9	6
GRE Verbal	Upper Half	7	1	10.7	0	12.4	2	4.4	3
	Lower Half	4	0	0.3	1	14.6	9	5.6	6
GRE Quantitative	Upper Half	9	0	7	0	12.2	2.6	5	4.6
	Lower Half	2	1	4	1	14.8	8.4	5	4.4
GRE Advanced Test	Upper Half	6.5	1	10	0	13.5	1	6.5	2
	Lower Half	4.5	0	1	1	13.5	10	3.5	7
Judgmentally Weighted Total	Upper Half	8.5	1	10	0	11	2	5	3
	Lower Half	2.5	0	1	1	16	9	5	6
Statistically Weighted Total	Upper Half	7	1	10	0	12.5	2	6	2
	Lower Half	4	0	1	1	14.5	9	4	7

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

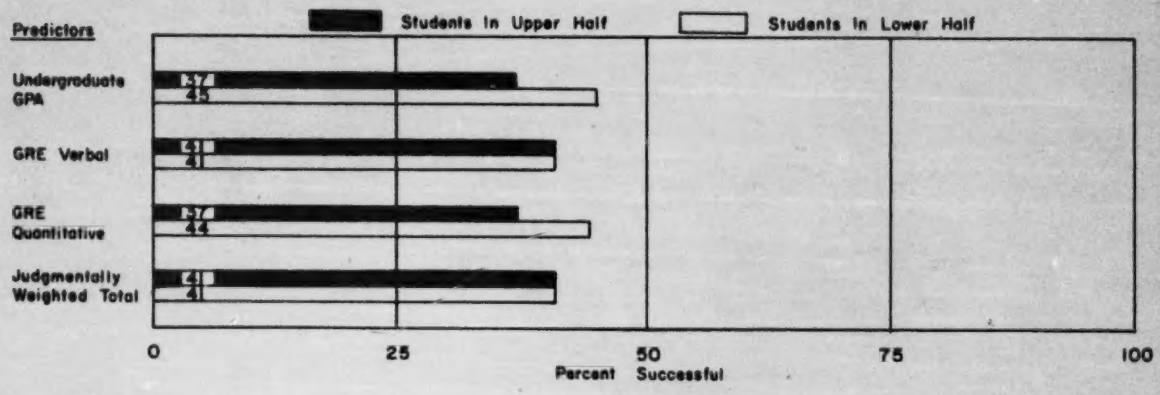
Department E
54 Students

Two studies were made for English students in this graduate school. In the larger (54 students), more recent group, neither Undergraduate GPA nor the GRE Aptitude Test scores showed any consistent validity. Relationships of the predictors with status were negligible or negative. It should be pointed out that the standard deviation on Undergraduate average was next to the smallest found in the 12 groups supplying this information.

It is possible that the ineffectiveness of the predictors in this group is attributable to sampling fluctuations and to the relative homogeneity of the group with respect to the Undergraduate GPA. An alternative hypothesis is that for students having the ability levels of those in this group, factors other than those measured by the available predictors are decisive for success.

Department E
54 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	7.2	1.7	1	1	1.9	0	8.2	5.9
	Lower Half	9.8	2.3	0	1	1.1	0	7.8	5.1
GRE Verbal	Upper Half	10	1	0	1	1	0	9	5
	Lower Half	7	3	1	1	2	0	7	6
GRE Quantitative	Upper Half	8	1	1	0	3	0	9	5
	Lower Half	9	3	0	2	0	0	7	6
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	9	1	1	1	2	0	10	3
	Lower Half	8	3	0	1	1	0	6	8
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

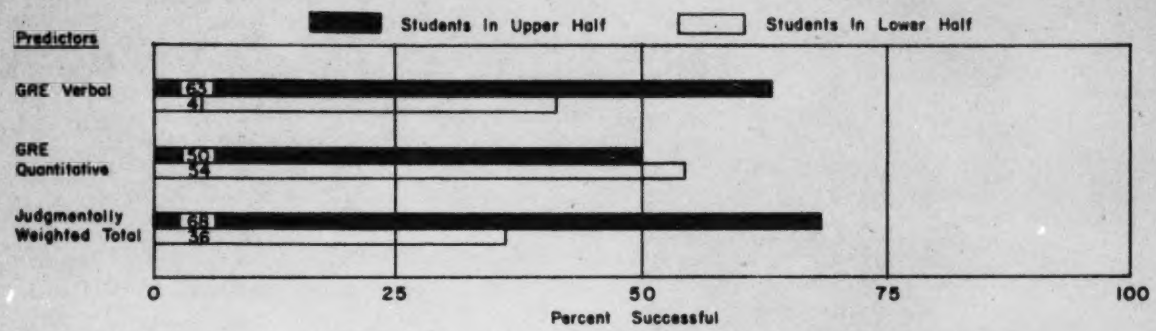
[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department E
25 Pre-1957 Students

This study was based on only 25 pre-1957 students for whom the Undergraduate GPA was not available. In this group, the Verbal Ability score had a relatively high validity (.47) and the Quantitative Ability score had a low positive validity (.08). The judgmentally weighted total for this small group showed a correlation of .34 with success.

Department E
25 pre-1957 students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	5.8	2	0	1	1	0	1.8	0.8
	Lower Half	2.2	0	3	1	1	0	3.2	2.2
GRE Quantitative	Upper Half	6	0	0.2	1	0.2	0	3	2
	Lower Half	2	2	2.8	1	1.8	0	2	1
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	7	1.5	0	1	1	0	2	0
	Lower Half	1	0.5	3	1	1	0	3	3
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

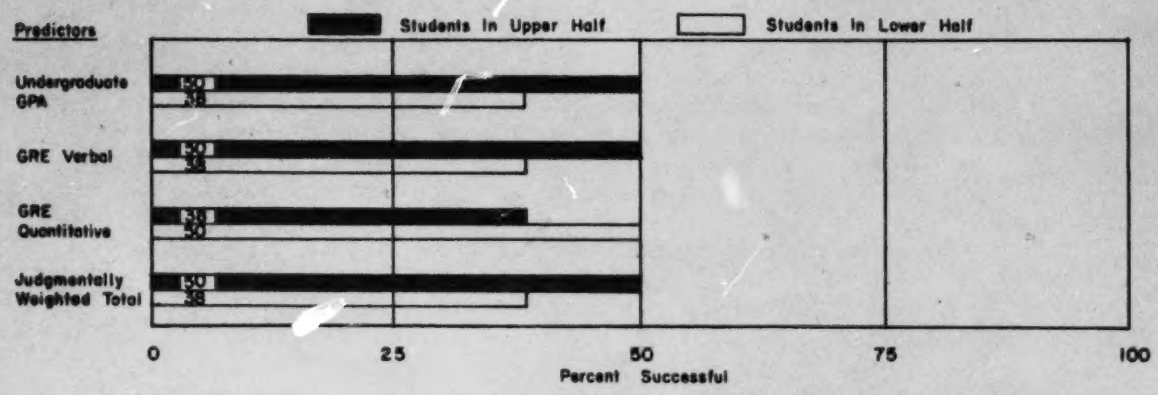
[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department F
32 Students

Although the results in the graphical analysis opposite are somewhat more favorable to the predictors (except the Quantitative Ability scores) than the correlational results, there is little reason to believe that either Undergraduate GPA or Aptitude Test scores are effective in predicting success within this group. Here, as in Department E, the possibility exists that factors other than those measured by the available predictors are decisive for success for students as high on Verbal Ability and Undergraduate GPA as this group is.

Department F
32 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	5	1	2	1	3	1	2	1
	Lower Half	4	0	2	0	6	2	1	1
GRE Verbal	Upper Half	5	1	2	1	4	0	2	1
	Lower Half	4	0	2	0	5	3	1	1
GRE Quantitative	Upper Half	4	1	1	1	5	1	2	1
	Lower Half	5	0	3	0	4	2	1	1
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	6	1	1	1	4	0	2	1
	Lower Half	3	0	3	0	5	3	1	1
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Summary

The fact that fairly high validity coefficients were obtained for the Advanced History Test scores in both graduate school departments which had data on this predictor is plausible, although the data are insufficient to justify broad generalization to history departments in other graduate schools.

Findings for the other predictors are somewhat erratic. The judgmentally weighted total worked virtually as well as the statistically weighted total in the one group for which this comparison could be made. In the other two groups, the validity coefficient of the judgmentally weighted total was relatively low, a result attributable to the low validity for Undergraduate GPA in Department H and for the Aptitude Test scores in Department I.

Prediction of Academic Status for Graduate Students in History

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced History[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department G (66 students)					
Validity Coefficient	.44	.41	.36	.51	.58	.59
Mean	2.93	575	509	565	---	---
Standard Deviation	.56	115	128	98	---	---
Highest Score	4.00	800	800	780	---	---
Lowest Score	1.70	290	230	360	---	---
	Department H (40 students)					
Validity Coefficient	-.19	.32	.43	---	.15	---
Mean	3.51	696	596	---	---	---
Standard Deviation	.50	79	108	---	---	---
Highest Score	4.00	820	800	---	---	---
Lowest Score	2.00	450	370	---	---	---
	Department I (28 students)					
Validity Coefficient	---	-.04	-.13	.46	.21	---
Mean	---	647	549	596	---	---
Standard Deviation	---	84	101	77	---	---
Highest Score	---	790	720	730	---	---
Lowest Score	---	420	290	440	---	---

[a] For the 1964-67 Candidate Norms group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Advanced History	560	84	

Department G
66 Students

In this school data were available for the three GRE scores and for the Undergraduate GPA. All had substantial validity, and both the judgmentally weighted and statistically weighted totals had relatively high validities (.58 and .59 respectively). To some extent, these results may reflect the fact that the group was relatively heterogeneous in ability. The standard deviation of Verbal Ability scores in this group was 115--the largest among the 21 groups studied. In addition, this group had a standard deviation of .56 in Undergraduate GPA--the largest in the 12 groups for which data on this predictor were available.

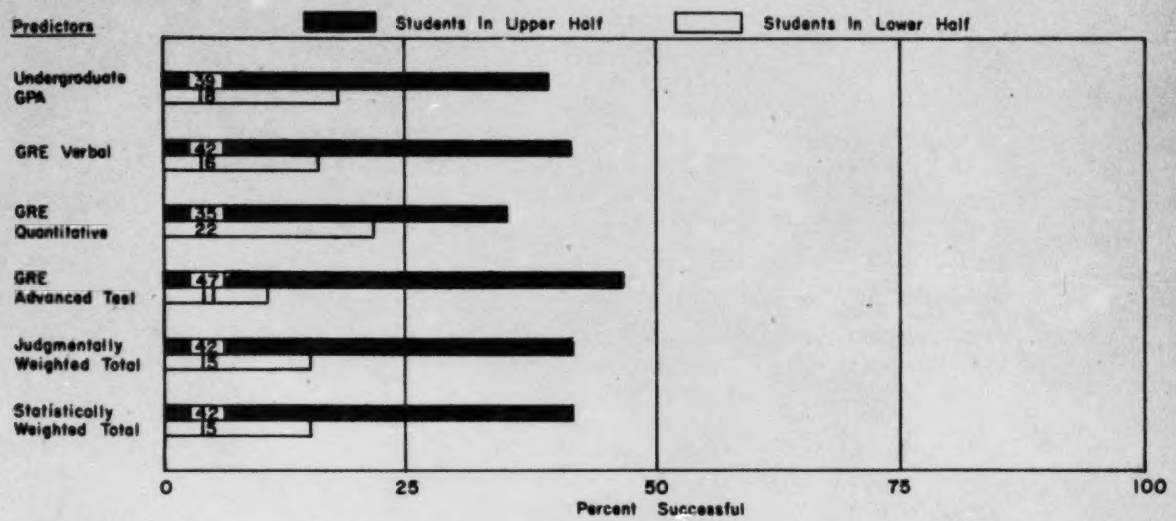
Examination of the graphical results opposite offers further evidence of the effectiveness of prediction. For both of the weighted composites, 42 percent of the students in the upper half and only 15 percent of the students in the lower half of the group were successful. Interestingly enough, the results for Advanced History Test scores showed 47 percent in the upper half successful and only 11 percent in the lower half successful.

Finally, it may be noted that of the eight students in this group who earned the Ph.D., seven were in the upper half on both the judgmentally and statistically weighted totals, on the Verbal Ability score, and on Undergraduate GPA. All eight students were in the upper half on the Advanced History Test score.

Of 13 students who withdrew by request of the university, only three were in the upper half of the group on the two weighted totals.

Department G
66 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	7	0	6	1	6	4	5	4
	Lower Half	1	0	5	0	5	9	4	9
GRE Verbal	Upper Half	7	0	6.8	0	4.4	3.4	6	5.4
	Lower Half	1	0	4.2	1	6.6	9.6	3	7.6
GRE Quantitative	Upper Half	6	0	5.7	0	6	5	4.3	6
	Lower Half	2	0	5.3	1	5	8	4.7	7
GRE Advanced Test	Upper Half	8	0	7.4	0	6.2	6.2	2	3.2
	Lower Half	0	0	3.6	1	4.8	6.8	7	9.8
Judgmentally Weighted Total	Upper Half	7	0	7	1	6	3	5	4
	Lower Half	1	0	4	0	5	10	4	9
Statistically Weighted Total	Upper Half	7	0	7	1	7	3	4	4
	Lower Half	1	0	4	0	4	10	5	9

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department H
40 Students

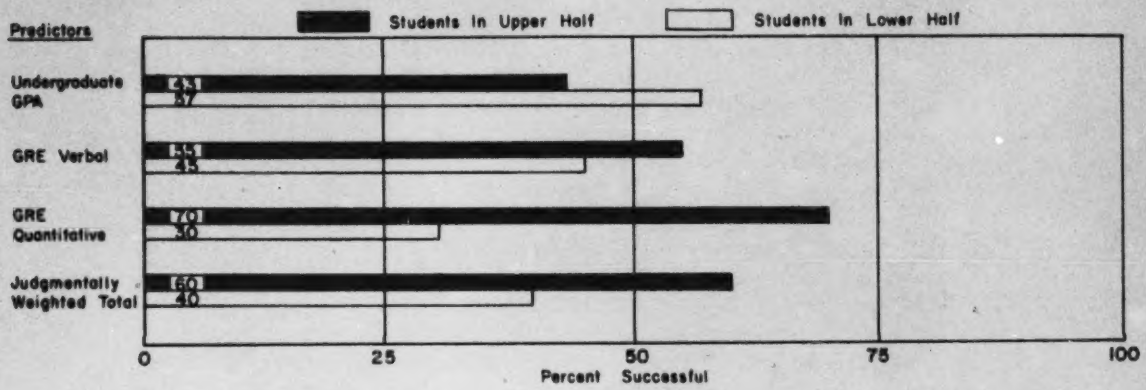
Two somewhat surprising findings emerged in the results for this school: Undergraduate GPA turned out to have a negative validity coefficient and the Quantitative Ability score was more predictive of success than the Verbal Ability score. An examination of the detailed criterion data opposite shows that only three of the 20 successful students had earned the Ph.D. degree, and that only six of the unsuccessful students had withdrawn.

As it turned out, the Undergraduate GPA, unlike the other predictors, was a poor predictor of faculty ratings, while Quantitative Ability predicted them rather well.

Since the judgmentally weighted total gave relatively heavy weight to Undergraduate GPA, its validity coefficient, though positive, was relatively low.

Department H
40 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	2	6	0.7	6.7	2.7	1	0	1
	Lower Half	1	6	4.3	3.3	1.3	1	1	2
GRE Verbal	Upper Half	1	7	3	6	1	1	0	1
	Lower Half	2	5	2	4	3	1	1	2
GRE Quantitative	Upper Half	2	9	3	3.5	0.5	1.5	0	0.5
	Lower Half	1	3	2	6.5	3.5	0.5	1	2.5
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	2	8	2	6	1	1	0	0
	Lower Half	1	4	3	4	3	1	1	3
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department I
28 Students

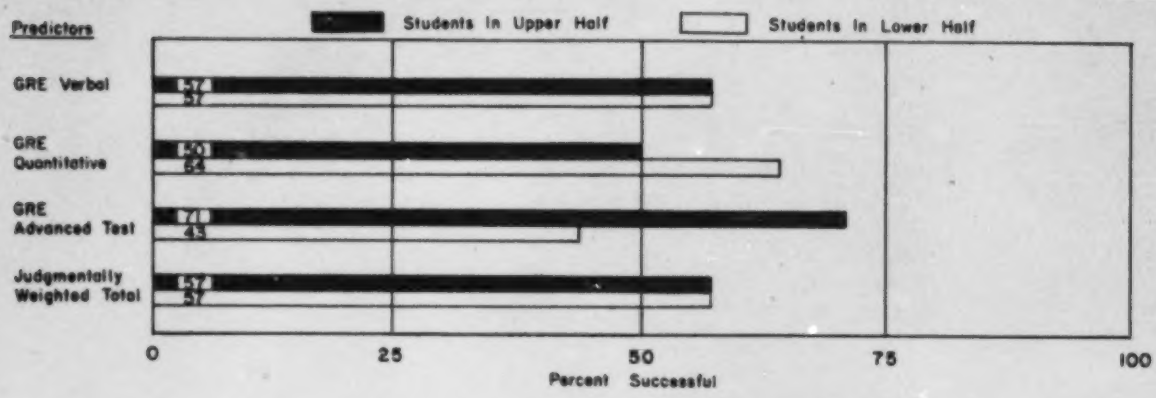
In this relatively small group, Advanced History Test scores had a substantial validity coefficient (.46), but both Aptitude Test scores had negative validities. In the correlational analysis, the judgmentally weighted total still had a modest validity, although noticeably lower than Advanced History Test scores alone.

However, in the simpler analysis used in the graphic presentation on the opposite page, there was no difference in success between students in the upper and lower halves on the judgmentally weighted total. Inspection of the detailed results on status shows that of eight students who earned the Ph.D., four were in the upper half and four in the lower half on Advanced History Test scores.

On the whole, the results for this group must be regarded as inconclusive as a basis for future decisions. They do suggest, however, that Advanced History Test scores have some relevance for predicting performance in graduate study.

Department I
28 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	4	4	0	2	0	1	0	3
	Lower Half	4	4	0	0	0	0	3	3
GRE Quantitative	Upper Half	3	4	0	1	0	1	1	4
	Lower Half	5	4	0	1	0	0	2	2
GRE Advanced Test	Upper Half	4	6	0	0	0	1	0	3
	Lower Half	4	2	0	2	0	0	3	3
Judgmentally Weighted Total	Upper Half	4	4	0	1	0	1	0	4
	Lower Half	4	4	0	1	0	0	3	2
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department J
42 Students

Only one group of graduate students in Philosophy was included in these studies. Consideration of both the correlation and graphic results suggests that Aptitude Test scores are more predictive of success than are Advanced Philosophy Test scores. Although Quantitative Ability scores yielded a noticeably higher validity coefficient than Verbal Ability scores, the simpler analysis presented on the opposite page suggests that the two predictors are about equally good.

The average score for this group on the Advanced Philosophy Test is remarkably high (779), but there is a reasonably large standard deviation. It may be conjectured that for students in the range of ability shown in this group, differences in aptitude may contribute more to relative success than do differences in preparation.

The large weight given to Advanced Philosophy Test scores in the judgmentally weighted total makes this composite a somewhat less effective predictor than the Quantitative Ability score alone.

Prediction of Academic Status for Graduate Students in Philosophy

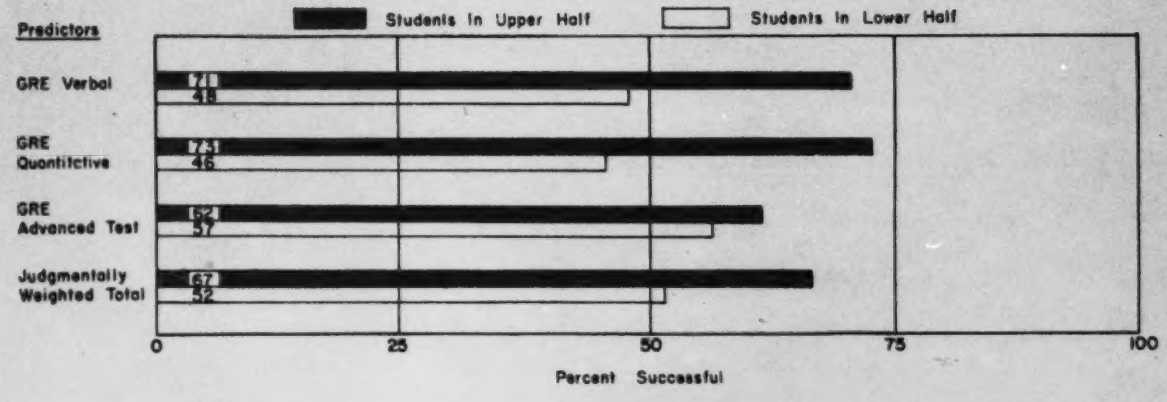
	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Philosophy[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department J (42 students)					
Validity Coefficient	---	.17	.44	.11	.23	---
Mean	---	708	646	779	---	---
Standard Deviation	---	73	92	101	---	---
Highest Score	---	830	850	950	---	---
Lowest Score	---	560	440	530	---	---

[a] For the 1964-67 Candidate Norms group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Advanced Philosophy	667	116	

Department J
42 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	11	4	0	2	0	0	3	1
	Lower Half	5	5	0	3	0	0	2	6
GRE Quantitative	Upper Half	9.2	6.2	0	0.4	0	0	2	3.2
	Lower Half	6.8	2.8	0	4.6	0	0	3	3.8
GRE Advanced Test	Upper Half	9	4	0	3	0	0	2	3
	Lower Half	7	5	0	2	0	0	3	4
Judgmentally Weighted Total	Upper Half	9	5	0	2	0	0	3	2
	Lower Half	7	4	0	3	0	0	2	5
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Summary

Results in the three relatively small groups of graduate students in physics were somewhat erratic. Judgmentally weighted total had good predictive power in one group, rather little in another, and none in the third.

Advanced Physics Test score predicted well for one group but was useless in the other for which it was available.

There was marked variation in the level of validity coefficients from school to school, but within any one school there was only moderate variation in validity from one predictor to another.

Prediction of Academic Status for Graduate Students in Physics

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Physics[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department K (39 students)					
Validity Coefficient	---	-.27	.01	.03	-.03	---
Mean	---	633	704	603	---	---
Standard Deviation	---	96	81	107	---	---
Highest Score	---	780	860	860	---	---
Lowest Score	---	370	450	400	---	---
	Department L (38 students)					
Validity Coefficient	.40	---	---	.68	.63	---
Mean	3.13	---	---	621	---	---
Standard Deviation	.45	---	---	121	---	---
Highest Score	4.00	---	---	910	---	---
Lowest Score	1.47	---	---	400	---	---
	Department M (32 students)					
Validity Coefficient	.22	-.14	.21	---	.24	---
Mean	2.96	551	672	---	---	---
Standard Deviation	.28	87	92	---	---	---
Highest Score	3.46	720	900	---	---	---
Lowest Score	2.20	380	460	---	---	---

[a] For the 1964-67 Candidate Norms group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Advanced Physics	622	134	

Department K
39 Students

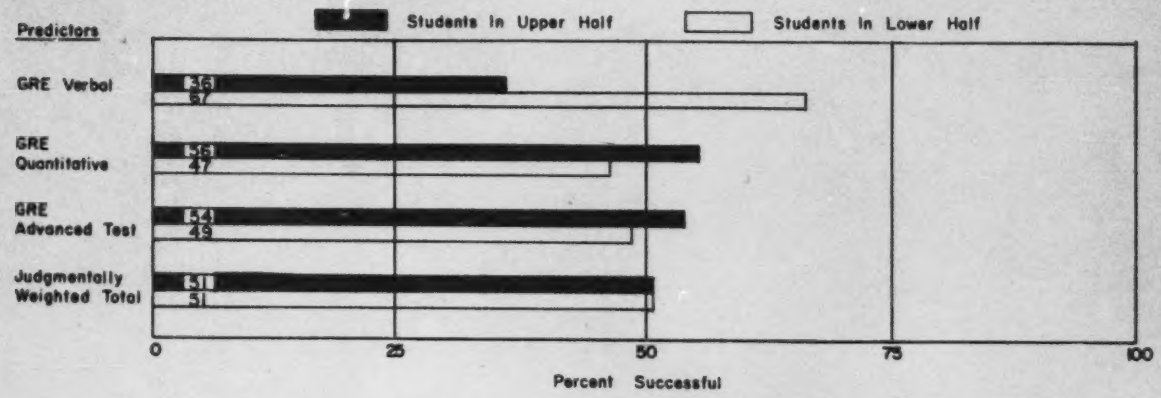
Neither the Aptitude Test scores nor those on the Advanced Physics Test showed any useful predictive power in this group.

Indeed, students in the lower half of the group on Verbal Ability score performed better than those in the upper half. The group was relatively homogeneous on Quantitative Ability score, with a standard deviation of 81.

This fact alone can hardly explain why all three predictors performed so poorly.

Department K
39 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph. D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	6.8	0.2	0	3.2	0	0	5	4.2
	Lower Half	10.2	2.8	0	2.8	0	0	2	1.8
GRE Quantitative	Upper Half	9.8	1	0	2.8	0	0	2.8	3
	Lower Half	7.2	2	0	3.2	0	0	4.2	3
GRE Advanced Test	Upper Half	9	1.5	0	3	0	0	2.5	3.5
	Lower Half	8	1.5	0	3	0	0	4.5	2.5
Judgmentally Weighted Total	Upper Half	8	2	0	4	0	0	3	2.5
	Lower Half	9	1	0	2	0	0	4	3.5
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

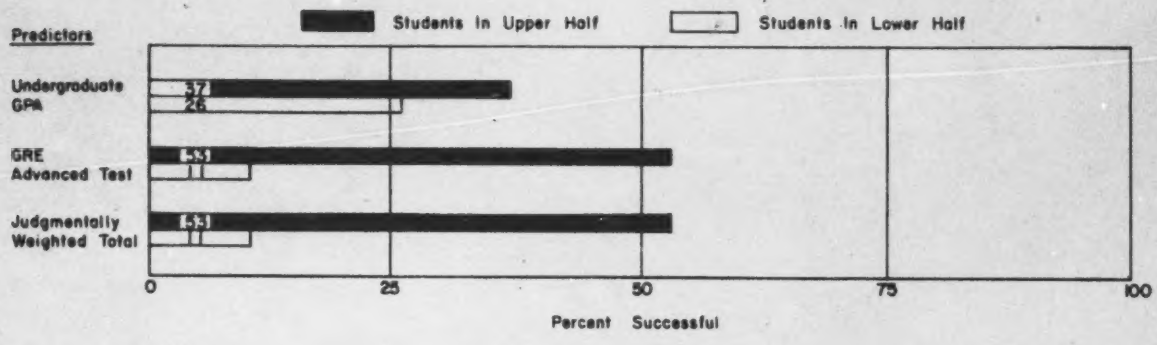
Department L
38 Students

The Advanced Physics Test and, to a lesser extent, the Undergraduate GPA, showed substantial predictive power. The Advanced Physics Test score had a somewhat higher correlation coefficient than the judgmentally weighted total, but the analysis presented in the graph opposite showed equal predictive power for both.

The graph indicates a striking difference in academic performance between students in the upper half on the Advanced Physics Test or on the judgmentally weighted total and students in the lower half on these measures.

Department L
38 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	0	0	7	0	11	0	1	0
	Lower Half	0	0	5	1	13	0	0	0
GRE Verbal	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Quantitative	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Advanced Test	Upper Half	0	0	10	1	8	0	0	0
	Lower Half	0	0	2	0	16	0	1	0
Judgmentally Weighted Total	Upper Half	0	0	10	0	9	0	0	0
	Lower Half	0	0	2	1	15	0	1	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department M
32 Students

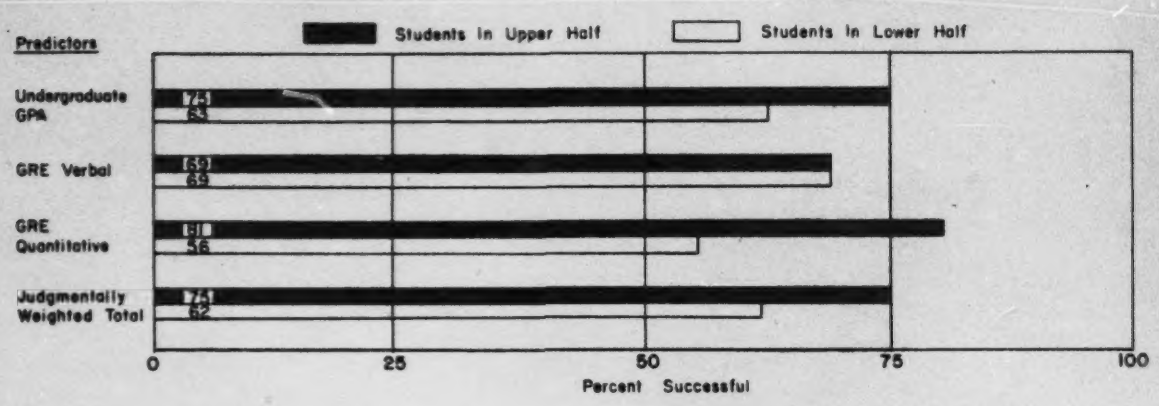
Undergraduate GPA, Quantitative Ability score, and the judgmentally weighted total showed a very modest degree of predictive power but the Verbal Ability score yielded no useful information.

A remarkable feature of this group was the very small standard deviation in Undergraduate GPA. The validity of Undergraduate GPA would probably have been higher if it had been more heterogeneous in this respect.

As shown on the opposite page, 13 of the 21 students who earned the Ph.D. were in the upper half on the Quantitative Ability score, 12 in the upper half on the judgmentally weighted total, and about the same number in the upper half on Undergraduate GPA.

Department M
32 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	11.9	0	0	0	4.1	0	0	0
	Lower Half	9.1	0	1	0	5.9	0	0	0
GRE Verbal	Upper Half	11	0	0	0	5	0	0	0
	Lower Half	10	0	1	0	5	0	0	0
GRE Quantitative	Upper Half	13	0	0	0	3	0	0	0
	Lower Half	8	0	1	0	7	0	0	0
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	12	0	0	0	4	0	0	0
	Lower Half	9	0	1	0	6	0	0	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Summary

Among the eight groups of graduate students in psychology, only the data for the groups in Department N yielded reasonably high validity coefficients.

Two departments (P and S) showed modest positive coefficients (.27 to .45) for available test scores, but small negative validities for Undergraduate GPA. In both of these departments, the Quantitative Ability score was the best predictor.

For the students in Department O, Advanced Psychology and Quantitative Ability scores had validities of .35 and .27, respectively, but the Verbal Ability scores yielded a negative validity (-.28).

In three of the departments (Q, R, and T), all validity coefficients were relatively low, particularly in department T, for which all coefficients were negative.

It is possible that the specializations within psychology (e.g., experimental, clinical, social, measurement) are more disparate than the specializations within other disciplines. If so, validity coefficients would tend to be lower. However, the data of these studies, of course, do not permit an evaluation of this hypothesis.

Prediction of Academic Status for Graduate Students of Psychology

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Psychology[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department N (49 students)					
Validity Coefficient	.38	.20	.32	---	.55	---
Mean	2.84	616	572	---	---	---
Standard Deviation	.48	93	101	---	---	---
Highest Score	3.80	760	780	---	---	---
Lowest Score	2.01	380	320	---	---	---
	Department N (32 pre-1957 students)					
Validity Coefficient	---	.28	.34	---	.36	---
Mean	---	611	542	---	---	---
Standard Deviation	---	85	83	---	---	---
Highest Score	---	770	680	---	---	---
Lowest Score	---	430	360	---	---	---

Prediction of Academic Status (continued)

	Undergraduate GPA	GRE Verbal[a]	GRE Quantitative[a]	GRE Advanced Psychology[a]	Judgmentally Weighted Total	Statistically Weighted Total
	Department O (47 students)					
Validity Coefficient	---	-.28	.27	.35	.22	---
Mean	---	705	678	685	---	---
Standard Deviation	---	62	81	49	---	---
Highest Score	---	830	860	770	---	---
Lowest Score	---	560	500	580	---	---
	Department P (44 students)					
Validity Coefficient	-.22	.35	.44	---	.18	---
Mean	2.98	618	570	---	---	---
Standard Deviation	.39	80	94	---	---	---
Highest Score	3.95	820	840	---	---	---
Lowest Score	2.24	410	400	---	---	---
	Department Q (38 students)					
Validity Coefficient	---	-.02	.18	-.11	.01	---
Mean	---	685	608	640	---	---
Standard Deviation	---	65	99	65	---	---
Highest Score	---	810	850	750	---	---
Lowest Score	---	540	400	520	---	---
	Department R (36 students)					
Validity Coefficient	.21	.03	.23	---	.27	---
Mean	3.75	635	594	---	---	---
Standard Deviation	.19	65	90	---	---	---
Highest Score	4.00	780	780	---	---	---
Lowest Score	3.23	500	400	---	---	---
	Department S (26 students)					
Validity Coefficient	-.11	.27	.45	.29	.18	---
Mean	2.96	603	548	607	---	---
Standard Deviation	.44	90	96	75	---	---
Highest Score	3.70	770	750	760	---	---
Lowest Score	2.10	450	360	480	---	---
	Department T (26 students)					
Validity Coefficient	---	-.27	-.24	-.35	-.39	---
Mean	---	653	597	621	---	---
Standard Deviation	---	70	79	66	---	---
Highest Score	---	770	720	740	---	---
Lowest Score	---	530	400	460	---	---

[a] For the 1964-67 Candidate Norms group (1), means and standard deviations of GRE scores were as follows:

	Mean	Standard Deviation	
GRE Verbal	522	125	(all fields)
GRE Quantitative	529	134	(all fields)
GRE Advanced Psychology	553	92	

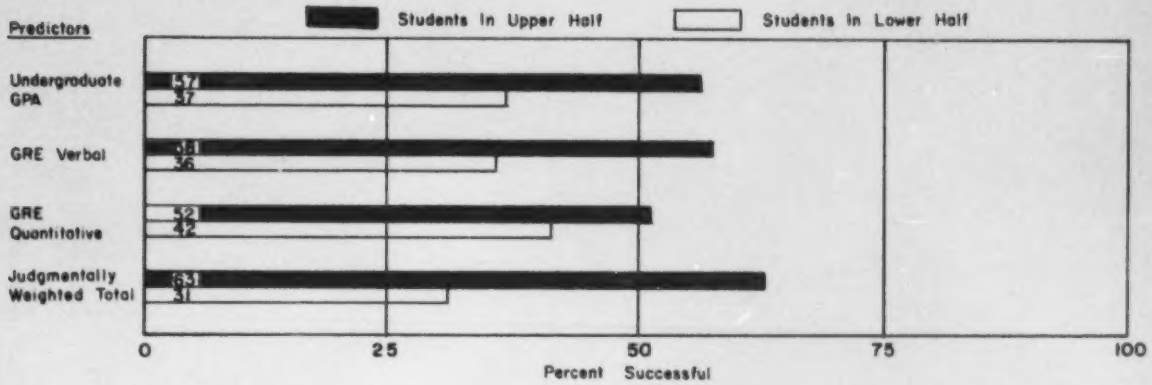
Department N
49 Students

This was the more recent of the two groups studied in this department. Both Undergraduate GPA and the Aptitude Test scores yielded moderately high validity coefficients. The judgmentally weighted total was noticeably better than Undergraduate GPA alone, indicating that the Aptitude Test scores, when weighted on the basis of a priori judgment, contributed to predictive effectiveness.

The graphical results opposite are consistent with the correlation results. It should be noted that the detailed status breakdown indicates that it is in predicting faculty ratings and in predicting withdrawal at the request of the school that the predictors are most effective. Only in Verbal Ability did more than half of the eight students who earned Ph.D.'s score in the upper half.

Department N
49 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	3	7	4	3	3	0	4.5	0
	Lower Half	5	0	4	2	7	3	3.5	0
GRE Verbal	Upper Half	5	3.6	5.6	2	3.6	1	3.6	0
	Lower Half	3	3.4	2.4	3	6.4	2	4.4	0
GRE Quantitative	Upper Half	4.2	5	3.5	3	3.5	2	3.2	0
	Lower Half	3.8	2	4.5	2	6.5	1	4.8	0
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	4	6.5	5	3	3	0	3	0
	Lower Half	4	0.5	3	2	7	3	5	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

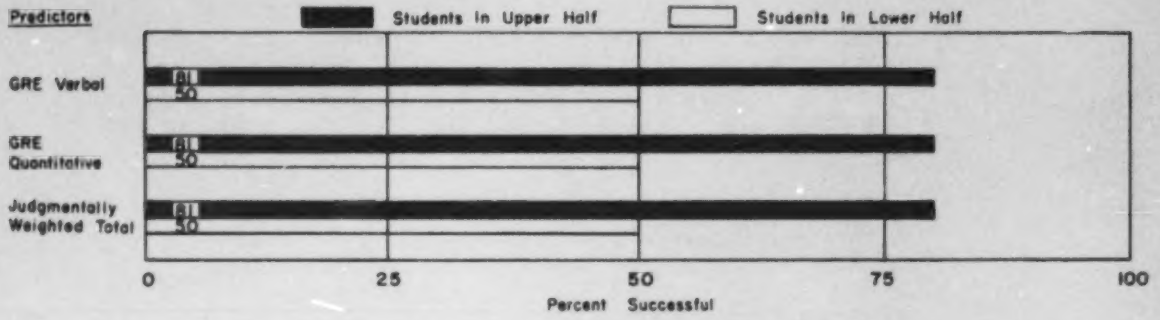
[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department N
32 Pre-1957 Students

In the study of this group, only Aptitude Test scores were available as predictors. On the basis of validity coefficients the judgmentally weighted total and Quantitative Ability score are slightly better predictors than Verbal Ability scores. The simpler analysis shown in the graphs indicates that the three predictors studied are equally effective.

Department N
32 pre-1957 students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	11	1	1	1	1	0	1	0
	Lower Half	7	1	0	3	1	1	3	0
GRE Quantitative	Upper Half	10	2	1	1	2	0	0	0
	Lower Half	8	0	0	3	0	1	4	0
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	10	2	1	0	2	0	1	0
	Lower Half	8	0	0	4	0	1	3	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department O
47 Students

Advanced Psychology Test and Quantitative Ability scores had modestly high predictive power. The validity coefficient of the Advanced Psychology Test score would presumably have been higher if the group had not been so homogeneous with respect to scores on this test.

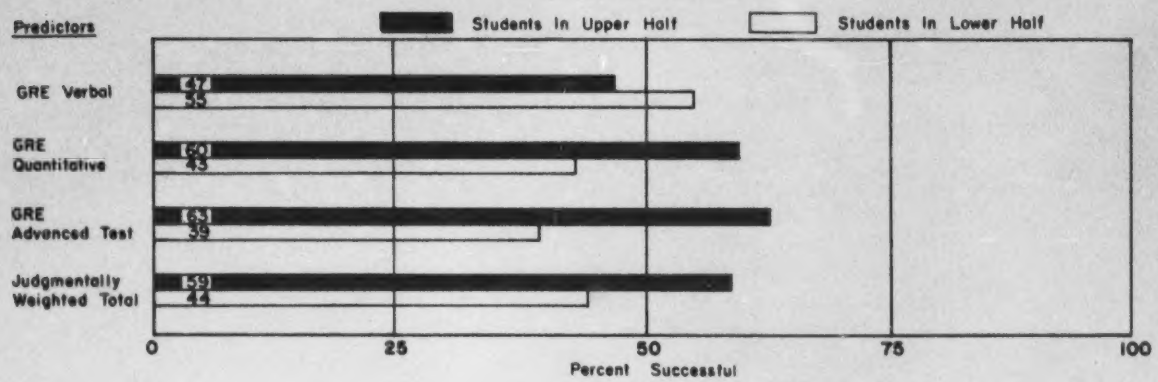
Verbal Ability score was remarkable in several respects: Department O had the highest mean and the smallest standard deviation in Verbal Ability scores in any of the eight groups of graduate students in Psychology. But students in this group with higher Verbal Ability scores did less well than those with lower scores. Only 47 percent of those in the upper half on the Verbal Ability score were successful as compared with 55 percent in the lower half.

Examination of the detailed status results reveals that 11 of the 20 students who received Ph.D.'s were in the upper half on Verbal Ability but that about two-thirds of the 14 students who withdrew voluntarily were also in the upper half.

Because of the poor performance of the Verbal Ability score in predicting success in this group, the judgmentally weighted total was less effective than either the Advanced Psychology Test or Quantitative Ability scores. In predicting the attainment of a Ph.D., however, the judgmentally weighted total was almost as effective as Advanced Psychology Test score and slightly more effective than Quantitative Ability score.

Department 0
47 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	11	0	0	0.2	3	0.2	0	9.2
	Lower Half	9	1	3	0.8	3	1.8	1	3.8
GRE Quantitative	Upper Half	12	0	2	0	2	1	1	5.5
	Lower Half	8	1	1	1	4	1	0	7.5
GRE Advanced Test	Upper Half	13.2	0	1.6	0	4	1	0	3.8
	Lower Half	6.8	1	1.4	1	2	1	1	9.2
Judgmentally Weighted Total	Upper Half	12.8	0	1	0	3	1	0.8	5
	Lower Half	7.2	1	2	1	3	1	0.2	8
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department P
44 Students

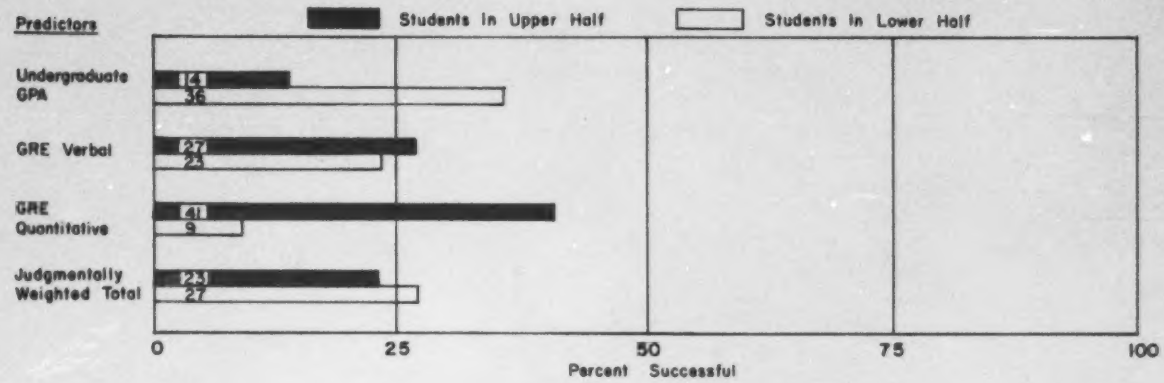
The two Aptitude Test scores predicted success moderately well in this group, but students with higher Undergraduate GPA's performed less well than those with lower standing in this measure.

Because of the poor performance of Undergraduate GPA, the judgmentally weighted total for this group had little or no value.

The detailed results on status, opposite, show that of the nine students who earned Ph.D.'s, three were in the upper half on Undergraduate GPA, and seven in the upper half on the Quantitative Ability score.

Department P
44 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	3	0	0	2	4	7	6	0
	Lower Half	6	1	1	0	1	8	2	3
GRE Verbal	Upper Half	4	1	1	1	3	6	4	2
	Lower Half	5	0	0	1	2	9	4	1
GRE Quantitative	Upper Half	7	1	1	0	0	8	3	2
	Lower Half	2	0	0	2	5	7	5	1
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	4	0	1	1	3	5	6	2
	Lower Half	5	1	0	1	2	10	2	1
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

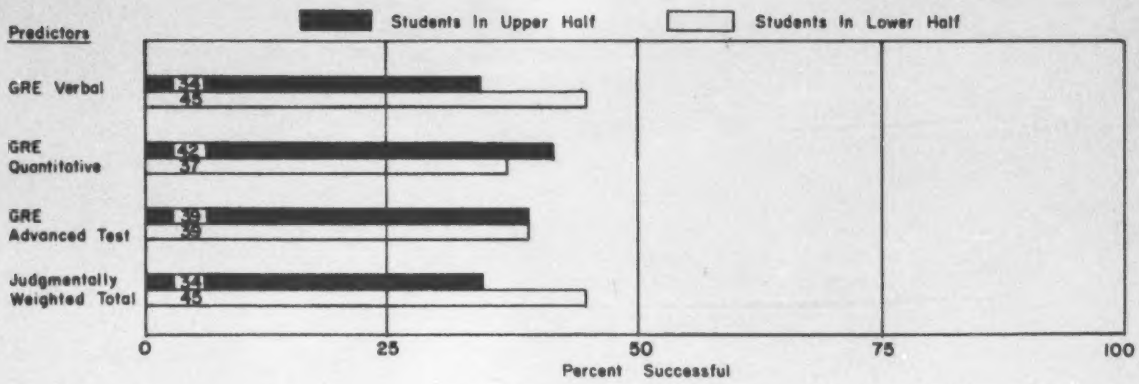
Department Q
38 Students

Validity coefficients for both the Aptitude Test and Advanced Psychology Test scores were quite low. Comparisons of students in the upper and lower halves on the various predictors (see opposite page) provided no reason for believing that any of the predictors offered useful information in this case.

The detailed information on status is also, in general, consistent with the information given by the validity coefficients and graph.

Department Q
38 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	6.5	0	0	0.5	1	0	8	3
	Lower Half	8.5	0	0	1.5	2	0	4	3
GRE Quantitative	Upper Half	8	0	0	1	1.5	0	6	2.5
	Lower Half	7	0	0	1	1.5	0	6	3.5
GRE Advanced Test	Upper Half	7.5	0	0	0	3	0	6	2.5
	Lower Half	7.5	0	0	2	0	0	6	3.5
Judgmentally Weighted Total	Upper Half	6.5	0	0	1	3	0	6.5	2
	Lower Half	8.5	0	0	1	0	0	5.5	4
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department R
36 Students

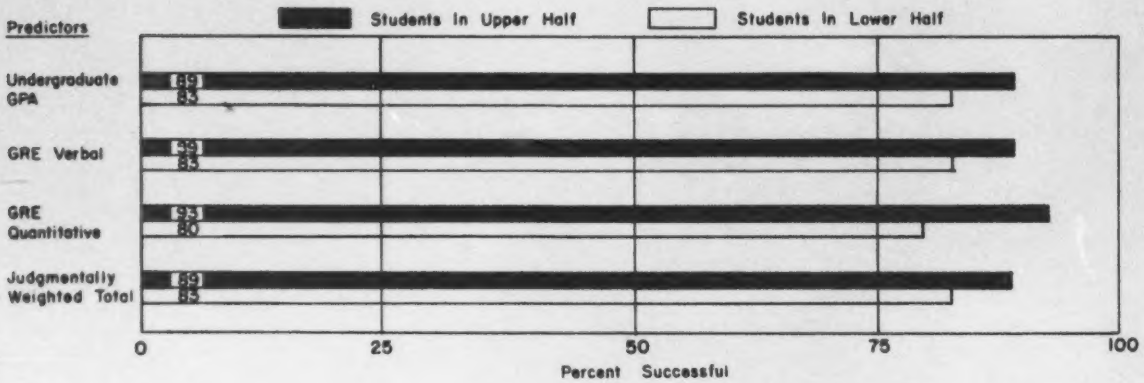
Validity coefficients and results presented in the graph opposite, considered together, indicate that Undergraduate GPA and Aptitude Test scores had a small predictive power in this group.

The relative merits of the various predictors differ, depending on whether the correlation coefficients, the graph, or data on attaining the Ph.D. are considered.

The validity coefficient for Undergraduate GPA, particularly, is probably an underestimate of its predictive value, for the standard deviation is the smallest of any department for which data were available on this predictor.

Department R
36 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a] 1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	11	3	2	1	1	0	0	0
	Lower Half	12	2	1	0	3	0	0	0
GRE Verbal	Upper Half	12.5	1	2.5	0	2	0	0	0
	Lower Half	10.5	4	0.5	1	2	0	0	0
GRE Quantitative	Upper Half	10.7	4	2	0	1.3	0	0	0
	Lower Half	12.3	1	1	1	2.7	0	0	0
GRE Advanced Test	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
Judgmentally Weighted Total	Upper Half	12	2	2	0	2	0	0	0
	Lower Half	11	3	1	1	2	0	0	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

Department S
36 Students

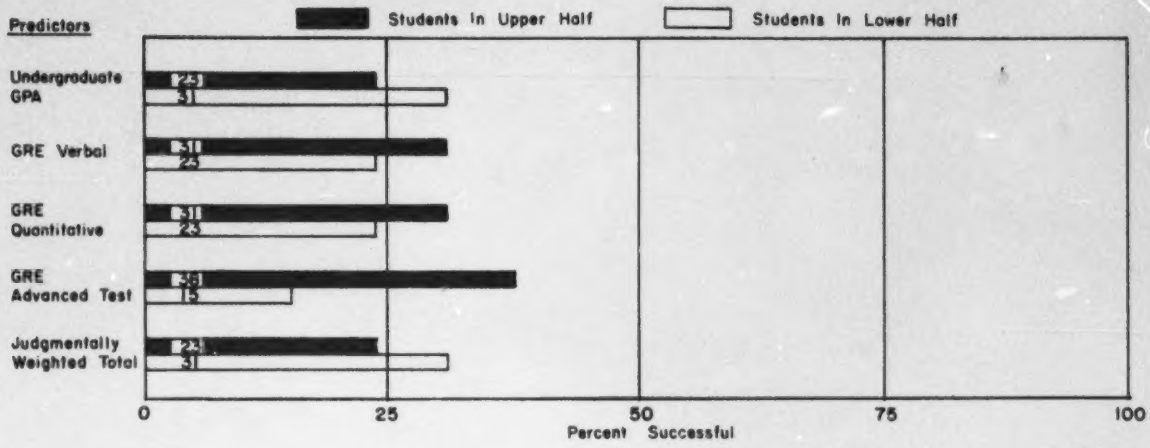
Both the Aptitude Test and Advanced Psychology Test scores were moderately good predictors in this group, with Quantitative Ability having the highest validity coefficient of the three. Undergraduate GPA, however, has a small negative validity coefficient. The poor performance of Undergraduate GPA resulted in a low validity for the judgmentally weighted total.

The graphic results on the opposite page show Advanced Psychology Test scores to be the most predictive. They also show that students in the upper half on the judgmentally weighted total were less successful than those in the lower half.

Examination of the detailed breakdown indicates that four out of the five Ph.D.'s in the group were in the upper half on the Advanced Psychology Test and that the four students who withdrew were all in the lower half on this test. For these groups, the Aptitude Test scores discriminated almost as well as their Advanced Test scores.

Department S
26 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	2	0	1	5.7	2	1	1	0.3
	Lower Half	3	1	0	5.3	2	0	1	0.7
GRE Verbal	Upper Half	3	0	1	7	2	0	0	0
	Lower Half	2	1	0	4	2	1	2	1
GRE Quantitative	Upper Half	3	1	0	7	2	0	0	0
	Lower Half	2	0	1	4	2	1	2	1
GRE Advanced Test	Upper Half	4	0	1	6	2	0	0	0
	Lower Half	1	1	0	5	2	1	2	1
Judgmentally Weighted Total	Upper Half	2	0	1	7.2	2	0	0.5	0
	Lower Half	3	1	0	3.5	2	1	1.5	1
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

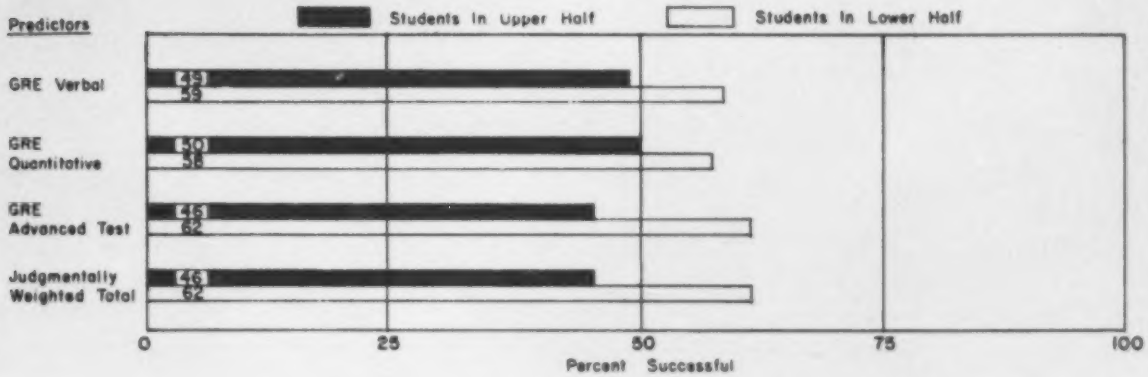
Department T
26 Students

For this group of students, both Aptitude Test and Advanced Psychology Test scores showed negative correlations with success; that is, students with good performance on the predictors had poor academic success, and vice versa.

Results shown in the graph on the opposite page are consistent with this finding. The detailed breakdowns of academic status show little difference between the students in the upper half and those in the lower half, but the small differences that do occur tend to favor students in the lower half.

Department T
26 Students

I. Percent of students in upper and lower halves of group on each predictor who had earned the Ph.D. or were still enrolled and rated "Outstanding" or "Superior"



II. Academic status of students in upper and lower halves of group on each predictor

Predictor	Standing on Predictor	Status Group[a]							
		1	2	3	4	5	6	7	8
Undergraduate GPA	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-
GRE Verbal	Upper Half	6	0.3	0	4.7	1	0	1	0
	Lower Half	7	0.7	0	5.3	0	0	0	0
GRE Quantitative	Upper Half	5.5	1	0	5	0.5	0	1	0
	Lower Half	7.5	0	0	5	0.5	0	0	0
GRE Advanced Test	Upper Half	6	0	0	5	1	0	1	0
	Lower Half	7	1	0	5	0	0	0	0
Judgmentally Weighted Total	Upper Half	6	0	0	5	1	0	1	0
	Lower Half	7	1	0	5	0	0	0	0
Statistically Weighted Total	Upper Half	-	-	-	-	-	-	-	-
	Lower Half	-	-	-	-	-	-	-	-

[a]Status groups were defined as follows:
1. Earned Ph.D.
2. Still enrolled, rated "Outstanding" or "Superior", has passed all examinations
3. Still enrolled, rated "Outstanding" or "Superior", has not passed all examinations
4. Still enrolled, rated "Average" or below, has passed all examinations
5. Still enrolled, rated "Average" or below, has not passed all examinations
6. Withdrew at request of university
7. Withdrew voluntarily after more than one year of study
8. Withdrew voluntarily after one year or less of study

IV.

SUMMARY

This report has presented the results of studies in which ten graduate schools cooperated. One or more graduate departments participated in each of six different disciplines: chemistry, English, history, philosophy, physics, and psychology. Students who first enrolled for graduate study in these departments during 1957, 1958, 1959, and 1960 constituted the subjects for the studies. In two departments, special studies were also made of pre-1957 students for whom record data were available.

Predictor data obtained for the students included scores on the Graduate Record Examinations Aptitude Test and/or an Advanced Test and, for the students in some of the departments, their undergraduate grade-point averages. Two types of information were obtained as assessments of performance in graduate study. One consisted of departmental ratings of the quality of graduate work. The other was a classification of each student's academic status (e.g., "earned Ph.D.", etc.) as of October, 1963.

For each participating department, studies were made of the relationships between each of the predictors and success in graduate study. The relationships between certain weighted combinations of the predictors and the criterion data were also studied.

The results varied widely from group to group, a fact attributable in part to the relatively small size of most of the groups. Summarization is further complicated by the fact that different sets of predictors were available for different groups. Although generalizations must, accordingly, be quite tentative, the following points may be noted here:

Undergraduate GPA, which was available for 12 groups, proved to be a reasonably good predictor in four groups (coefficients from .38 to .49) but a poor predictor in five others (coefficients from .01 to -.22).

In all 12 groups for which Undergraduate GPA was available, the judgmentally weighted total obtained by applying reasonable weights to each predictor yielded better prediction than Undergraduate GPA alone. Six of the groups showed a gain of .14 correlation points or more; the range of gains was from .02 to .40. In the four groups where Undergraduate GPA was most effective, the judgmentally weighted total worked very well, the coefficients ranging from .55 to .63. On the other hand, in the five groups for which Undergraduate GPA was an unsatisfactory predictor, the judgmentally weighted total was poor or unsatisfactory with coefficients ranging from .18 to -.12.

The Advanced Test scores, which were available for 12 groups, showed reasonably high coefficients in four groups (from .43 to .68) but had very low coefficients in four groups (from .11 to -.35). In the four groups for which the Advanced Test worked well, the judgmentally weighted total was higher for two groups and lower for two. In the four groups for which the Advanced Test score was unsatisfactory, the judgmentally weighted total was also unsatisfactory in all but one, for which the coefficient was .23.

In the four groups having sixty or more students, the statistically weighted total (obtained by use

of multiple regression) yielded a range of coefficients from .30 to .67. In only one out of four comparisons did the statistically weighted total show an appreciable advantage over the judgmentally weighted total. These results offer some support for the usefulness of the relatively simple logical approach to prediction embodied in the judgmentally weighted total.

On the whole, the results of these studies make it clear that prediction of success in graduate work is exceedingly difficult. Although the validity coefficients obtained were reasonably high and consistent in some departments, they varied greatly from one predictor to another or were consistently low in others.

In view of the critical importance of graduate study and the importance of effective prediction both to the student and to the graduate school, the results emphasize the urgency of seeking ways to improve prediction. The following suggestions illustrate some of the things which might be done.

To begin with, the nature of success in graduate school might profitably be clarified. For example, a group of graduate students having appropriate prediction data could be followed systematically over a period of years. Their performance at the end of the first, second, and subsequent years of study, their dissertation work, and even their career performance could be utilized in annually updating an assessment of their quality. The raters would have to avoid consulting the predictor data during the course of this study. However, statistical analyses could be made of the predictors after each year's ratings to determine possible changes in relative predictive value of

each available predictor. Equally useful would be an exploration of the issues involved in assessing the performance of each student.

Efforts might also be directed toward the identification of additional predictors, such as letters of recommendation, and to more judgmental use of existing predictors. Thus, a rating of promise based on a consideration of Advanced Test scores in the light of extent and quality of training a student has received in his major field might prove to be a useful supplementary predictor of performance.

Still another point of view which would be worth trying would be to form an overall grading of promise on the basis of all information available about a student at the time of admission and to correlate the resulting ratings with subsequent performance. This approach would afford an indication of the over-all level of predictive accuracy achieved by the individual making the ratings. Essentially this procedure was applied by Chauncey and Fowler in studies of GRE validity at Harvard University some thirty years ago. A summary of their study is given in Predicting Graduate School Success (4). Intensive studies in particular departments should contribute greatly to a better understanding of determiners of success in graduate study.

REFERENCES

1. Handbook for the interpretation of GRE scores, 1967-68. Princeton, New Jersey: Educational Testing Service, 1967.

2. Lannholm, G. V., Graduate schools requiring or recommending GRE scores for initial admission to graduate study. Graduate Record Examinations Special Report, Number 67-3. Princeton, New Jersey: Educational Testing Service, June, 1967.

3. Lannholm, G. V., Review of studies employing GRE scores in predicting success in graduate study, 1952-1967. Graduate Record Examinations Special Report, Number 68-1. Princeton, New Jersey: Educational Testing Service, March, 1968.

4. Lannholm, G. V. & Schrader, W. B., Predicting graduate school success: An evaluation of the effectiveness of the Graduate Record Examinations. Princeton, New Jersey: Educational Testing Service, 1951.

Appendix A

Letter of Invitation to Participator

Dear Dean _____:

Increasing emphasis on the importance of graduate education has resulted in larger numbers of graduate school applicants in recent years. This has led to greater interest in selection procedures and to more widespread use of Graduate Record Examinations in connection with the evaluation of applicant qualifications. To assist the increasing numbers of graduate schools and other organizations using the test results, it has been proposed that we undertake a cooperative study to evaluate the test data and other predictors of success in doctoral programs.

Although a number of local studies have been made by individual graduate schools, the results of many have limited value for several reasons:

1. Since the only predictors involved in most of the studies were the test scores, they did not produce evidence of the relative weight to be given other predictors.

2. Often the only evidence available to indicate the student's degree of success in graduate study was his grade-point average. Because course grades seldom have high reliability, may reflect many different qualities, and are usually restricted in range, they have serious limitations for use as criteria in such a study.

3. Most of the studies were oriented toward the prediction of success during the first year of graduate study only. Studies are needed which take into account the performance of doctoral students during three or more years of graduate work.

As you doubtless know, the Committee on Testing of the Association of Graduate Schools has served for a number of years as our Advisory Committee on Graduate Level Testing. As such, it has kept abreast of practices and needs in the use of tests in the admission of graduate students. It is at the recommendation and with the endorsement of the Committee that this study is being undertaken.

The purpose of this letter is to invite your graduate school to participate in this study. So that you will know what will be involved if you accept this invitation, I should like to describe the general nature of the study and the data which the participating departments will be asked to furnish. First of all, the study will include only those students enrolling for doctoral programs in 1957, 1958, 1959, and 1960. We should like the following departments in your graduate school to participate in the study:

From knowledge available to us, it is believed that GRE scores (on the Aptitude Test and/or an Advanced Test) will be available for substantially all the students who entered the graduate study programs in the above departments in the years cited and that the total number of such students in each department will be adequate for the proposed study.

For each of the students, the following information will be requested: the student's full name; year of entrance; undergraduate average grade; college of baccalaureate degree; rating of applicant before graduate school entrance; status as of October, 1963; GRE scaled scores; and a special evaluation of graduate school performance. Special forms and instructions for the requested information will be furnished upon receipt of your acceptance of this invitation to participate in the study. The enclosed draft of the instruction sheet which will accompany a supply of the information forms describes more fully the nature of the information needed on each of the above items.

Thank you in advance for your careful consideration of this invitation. I hope that your institution will be able to participate in this study. It will be most helpful if you will complete and return the enclosed response form at your earliest convenience, whether or not your graduate school will be able to participate in any of the departments cited herein. You may wish to retain the second copy of the completed response form for your records.

Yours sincerely,

Gerald V. Lannholm, Director
The Graduate Record Examinations

Appendix B

Instructions and Forms

Description of Student Data Requested
(To be entered on roster sheets, 12 students per page)

1. The Student's Full Name. If name has been changed because of marriage or otherwise since applying for admission, please give both present and previous names.

2. Please leave blank. This column is for ETS processing.

3. Month and Year of Entrance to Your Graduate School. To help us interpret data, please give month and year, if possible. Numerical entries, such as 9-59, would be preferable.

4. College Average Grade. We will need undergraduate average grade in the form in which it is used in your admissions procedures, if it is available. In order to be used in the study, undergraduate average should be on a uniform basis for all applicants. If you make an adjustment in the averages to take account of differences in standards among undergraduate colleges, the adjusted averages would be preferable. Please indicate what type of scale you used. For example, "A = 4, B = 3, C = 2, D = 1, F = 0" or "Percentage-type, with 65 passing."

5. College Last Attended. Ordinarily, this should be the college awarding the bachelor's degree, even if the student had taken graduate work at a different university.

6. Rating Before Entrance. If your admissions procedures include a quality rating of applicants, we should be glad to include these ratings in the study. A brief description of how these ratings are made would be useful in interpreting the results.

7. Status as of October, 1963. We believe that each student will belong to one of the six categories listed on the data sheet. However, if a particular student does not exactly fit any of the categories, we hope you will assign the code which best describes his status.

8-11. GRE Scaled Scores. Please list on the roster the GRE scaled scores earned by the student, together with the name of the Advanced Test taken, if any. If the student took the GRE more than once before he enrolled, please list the most recent scores available before admission, and indicate "Repeater" under remarks. If test information is

difficult to assemble from your records, we can obtain it from our files. If we are to obtain the test information , it would be especially helpful if you could enter the student's date of birth in the remarks column to assure proper identification of the student.

12. Please leave blank. This column is for ETS processing.

13. Over-all Rating, or Evaluation of Graduate Study Performance. This evaluation, which is of decisive importance in the study, should represent the combined judgment of a departmental committee regarding the general excellence of each student who has earned the Ph.D., who has passed all examinations, or who is still enrolled. (These are categories 1, 2, and 3 in column 7.) Although it is not necessary to rank each student, we hope you will be able to assign students to quality levels so that the percentage assigned each rating will be within the suggested percentage range for each. It should be emphasized that these ratings are intended only to show relative standing within the total group being rated by the departmental committee.

Code	Description	Percentage of Group
5	Outstanding	5 to 15%
4	Superior	15 to 25%
3	Average	35 to 45%
2	Below Average	15 to 25%
1	Poor	5 to 15%

14. Remarks. Please indicate any students whose records are not comparable with the rest of the group; for example, foreign students having a marked language handicap, students suffering from a severe physical handicap, or students whose program was interrupted for a year or more by taking a job, by army service, or otherwise.

Department _____ Name of Student _____

University _____ Name of Rater _____

Title of Rater _____

INSTRUCTIONS FOR RATING

In rating the student with respect to the designated characteristics, please compare him with students who have actually received the doctorate in his field in your university during recent years. The ratings are intended to show relative standings. Thus, the percentages given for each descriptive term should be considered an essential part of the meaning of the term for rating purposes. Insofar as possible, the ratings should reveal the characteristics in which a student is relatively strong and those in which he is relatively weak in comparison with students earning the doctorate. Please circle the appropriate rating number for each characteristic, or check the last column.

CHARACTERISTIC	RATING					
	Poor (Bottom 10% of Ph.D.'s)	Below Average (20% of Ph.D.'s)	Average (Middle 40% of Ph.D.'s)	Superior (20% of Ph.D.'s)	Outstanding (Top 10% of Ph.D.'s)	No opportunity to observe
1. Mastery of fundamental knowledge in his general field.	1	2	3	4	5	
2. Mastery of relevant research skills	1	2	3	4	5	
3. Intellectual breadth	1	2	3	4	5	
4. Originality in research	1	2	3	4	5	
5. Industry and application	1	2	3	4	5	
6. Effectiveness of written reports	1	2	3	4	5	
7. Effectiveness of oral presentations	1	2	3	4	5	
8. Promise as a productive research worker	1	2	3	4	5	
9. Promise as a teacher	1	2	3	4	5	
OVER-ALL EVALUATION	1	2	3	4	5	

Student Data Form

Full Name (Please include name changes, if any)		Month and Year of Entrance	Coll. Avg. Grade *	College Last Attended	Rating Before Entrance **	Status as of Oct. 1963 ***	GRE Scaled Scores Aptitude V	Aptitude Q	Advanced Score	Advanced Name		Over-all Rating ****	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

* Scale used for college average grade: _____

** Scale used for rating before entrance (Use reverse side for further description): _____

*** Please indicate status according to the following code:
1-Earned Ph.D.
2-Has passed all examinations but has not received degree.
3-Has not passed all examinations but is currently enrolled.
4-Withdrew at request of university.
5-Withdrew voluntarily after more than one year of study.
6-Withdrew voluntarily after one year or less of study.

**** This is the over-all evaluation of special importance to this study.